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OUTLINES

OF

DESCRIPTIVE PSYCHOLOGY

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OUTLINES

OF

DESCRIPTIVE PSYCHOLOGY

A TEXT-BOOK OF MENTAL SCIENCE

FOR

COLLEGES AND NORMAL SCHOOLS

BY

GEORGE TRUMBULL LADD
PROFESSOR OF PHILOSOPHY IN YALE UNIVERSITY

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Printed by Berwick & Smith,
Norwood, Mass., U.S.A.

PREFACE

THIS book has been written with a definite intention constantly in view. In size, selection and arrangement of material, style, and mechanical structure, my effort has been to adapt it to certain beginners, with an average grade of culture and amount of time at disposal. In a word, it is — as its title designates — a *text-book* of the science of psychology for colleges and normal schools. I have, therefore, had in mind, from first sentence to last, both the pupil and the teacher in their mutual relations. No pains has been spared to make the presentation of the subject such that it can be intelligently and "economically" yet thoroughly studied and successfully taught.

It will doubtless facilitate my general purpose if the explanation of it is extended into a few particulars. And first, attention is called to the fact that this work aims to give a complete but summary treatment of the phenomena of human mental life, from the different points of view, and with all the methods of research, which belong to modern psychology. The aid of experimental and physiological investigations is constantly sought. But these investigations are — at least at present — almost entirely unable to deal with the later and more complex developments of the mind. Unless we describe, and as far as

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possible explain, the growth of intellect, the knowledge of Self and of Things, the formation of the higher sentiments and emotions, and the conditions for the attainment of character, we neglect the main part of the task of the psychologist. Our picture of the mental life may have a scientific appearance, but it is not at all the faithful picture of a developed human mind. In aiming at what is, perhaps, best called the "balancing" of the material, I have tried to give these "higher faculties," without neglecting the treatment of more fundamental processes, the amount of space they naturally deserve and require.

The method which I have followed is both analytic and genetic. The First Part describes those elementary forms of functioning which analysis discovers as entering into all mental life. The Second Part traces the evolution of the principal "faculties" of mind, as much as possible in their combined and interdependent action. In both parts I have drawn upon all the different sources of the science, with grateful acknowledgment of help from workmen of various schools, but without handing in my allegiance, or dogmatically teaching to my readers, the opinions of any school. This attitude, as well as the text-book character of the work, explains many of its omissions. There are scarcely any footnotes, and comparatively few definite references of any kind; there are no extended quotations from other writers; the details of discussion and of argument for the author's views are wanting here, and must be sought in his other works. At the same time care has been taken not to create the impression that the views of this book are beyond all need of comparison with other investigators. On the contrary, commendatory or critical reference to others has been freely introduced; and a very brief bibliography, which it is hoped will lead the student to wider reading, has been appended to each chapter.

In the style of presenting the various subjects I have tried chiefly to secure clearness, conciseness, and order. These seem to me the more important qualities in such a text-book as this aims to be. But these qualities make it impossible to introduce lengthy stories or disquisitions aside, or other interesting illustrative material. The pupil, on his part, should begin the science, as he should begin every scientific study, with the determination to do honest and faithful work. This determination will soon secure a more intelligent and lasting interest in the subject than can otherwise be gained by any devices of the author, however skilful. But the teacher on his part is left free to supplement the text-book from his own resources, and to stimulate the pupil to draw upon all his own experience for illustrative and life-giving details.

A few words are also needed to place the present work in its proper relations to other works on the same subject by the same author. The "Elements of Physiological Psychology" and the "Outlines of Physiological Psychology" are not at all displaced by this book in the use of those who wish to study mental life with more detail, from the experimental and physiological points of view. Indeed, where there is time for this, reading of one of the physiological psychologies may be combined with the use of the present work. For younger pupils, or those who have less time, the "Primer of Psychology" will still be preferred; while more advanced students, and beginners who have more leisure for reading than belongs to the college classroom, or who object to the definitely text-book form of presentation, will probably prefer the larger "Psychology, Descriptive and Explanatory."

I wish to make grateful acknowledgment of the help received from my colleagues, Professor George M. Duncan and Dr. Edward W. Scripture. Professor Duncan read all the manuscript and made many valuable suggestions toward adapting the book better for classroom use. Dr. Scripture has greatly assisted in preparing the diagrams, — several of which are of his own devising, — and has carefully scrutinized the experimental material. Both of these gentlemen have read all the proofs. I feel that their experience as successful teachers, added to the experience of the author, may reasonably be relied upon to have produced a serviceable text-book of psychology. The author alone is responsible for the opinions advocated and for the method of their presentation, as well as for any mistakes and deficiencies which may have escaped his observation.

It is as both pupil and teacher that I send out this text-book of psychology, and ask for it kindly consideration from other pupils and teachers.

GEORGE TRUMBULL LADD.

YALE UNIVERSITY, January, 1898.

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OUTLINES OF DESCRIPTIVE PSYCHOLOGY

CHAPTER I

INTRODUCTORY

Definition of Psychology. — Although it requires much time and study to form a worthy conception of the science (its nature, method, and aims) of which we are to treat, the following preliminary statement will be of use: *Psychology is the systematic description and explanation of the phenomena of consciousness, as such.* For the phrase "phenomena of consciousness," such terms as "conscious states," or "processes," "psychical (or mental) activities," or even the technical word "psychoses," may sometimes be substituted. For the principal classes of these phenomena the familiar words, sensations, feelings, ideas, memories, imaginings, thoughts, sentiments, decisions, choices, etc., must often be employed. What all these conscious states in fact are, and what conditions accompany and determine them, every adult knows to some extent by his own experience. But the complex *structure*, so to speak, and the manifold *causes* and *connections* of many of them, still baffle the supremest efforts of expert inquirers. What these phenomena actually are, as conscious states, and how they come to exist and to follow each other in the order which they in fact assume, forms the primary subject of the investigations of psychology.

Our definition has restricted the sphere of psychology to conscious states, or psychoses, *as such.* This rather uncouth way of helping out the formula is necessary, for the following reasons. From a certain point of view (and this is the distinctively psychological), all the sciences may be regarded as only "systematic description and explanation" of man's conscious states. Science itself is a human psychical activity; it is systematic and verifiable knowing. And since there is no such thing as knowing in general, every scientific fact or law is, in what is called its *subjective* aspect, somebody's perception, imagination, or cognition. That which, for the scientific botanist, is a real thing, a tree or a plant, is for psychology a "phenomenon of consciousness"; it is in either case a perception or conception to which the attribute of "scientific" or "unscientific" may be ascribed. The scientific geologist, too, gathers the facts of his science only by his own observation, or by belief in the reports given by others of their observations, — in either case, helped out by imagination and memory. His scientific generalizations are, therefore, for the psychologist the conclusions of the mind's observing and reasoning processes; they are judgments, thoughts, conjectures, as to what is true or was true. But judgments, thoughts, conjectures, etc., are psychical events; they never are, and never can be, anything, *in themselves considered*, but conscious states.

Now it is "in themselves considered" — the perceptions by the senses, the memories, thoughts, conjectures, *as such* — that the psychologist studies the phenomena of consciousness.

Psychologist's Point of View. — The student of nature is sometimes said to take the *objective* point of view, in distinction from the point of view taken by the psychologist, which is, by way of contrast, then called *subjective*. The distinction is valid and worth the making; but it requires a word of explanation. We have just seen that all the sciences of nature may be regarded as conscious states of the men who observe the facts, and who think out the connections between the facts. But this is to affirm that physics, chemistry, geology, botany, and all similar forms of knowledge may be regarded as in some sort "subjective." On the other hand, when I consider my own thoughts or imaginings, and when I reflect upon the nature of the being which can behave in this way, — can be said to "have" the thoughts and imaginings,— I am making these psychical processes and psychical powers the "objects" of my observation and reflection. Sensations, as truly as stones, — beliefs, as actually, though not so successfully, as bees and beetles, — volitions, as undoubtedly as volcanoes, — can be made the objects of scientific investigation. Yet the psychologist's point of view is properly called subjective.

The more important bearings of this distinction between the subjective and the objective cannot be made clear at present. But there can be no doubt about some items of our experience which enforce the distinction. I am the owner (in German the *Träger*) of my conscious pains and pleasures, of my thoughts and sentiments, as I am not of any of the natural objects which belong to me. In turn, your feelings and thoughts are "yours"; and those of the third man yonder are "his"; they are neither yours nor mine. Conscious states, as such, are always and unavoidably held, by the one who observes or reflects upon them, to belong to some conscious subject, or Self, whose states they are. Only the subject of these conscious states can make them the immediate object of observation. Only the signs or manifestations of them can be observed by others: such as the eye that kindles with love, or the cheek that flushes with anger, or the action that follows the decisive choice. On the other hand, the owner, or subject, of the conscious states does become aware of them as no other observer can. His knowledge is — at least, to some extent — internal and subjective, while the knowledge of others can only be external and interpretative. But more in regard to this distinction will follow in other connections.

Assumptions of the Psychologist. — The student of mental life can no more dispense with all assumptions than can the student of any form of particular science. Psychology has as much right to its list of facts and truths that are taken for granted as has either physics or biology. No attempt will here be made to give an exhaustive treatment of the legitimate assumptions of the psychologist, or even to enumerate them without omission of any. Neither can the psychologist, any more fitly than the devotee of any form of physical science, be called upon to define all the terms, or to analyze completely all the conceptions, which he is obliged to employ. The following, however, should be noted as among the most important.

It is assumed that there are such facts as conscious processes, or psychoses. But to assume this is only to admit that men perceive and feel and reason and choose; and such an admission no one can fail to make. On the other hand, a scientific definition of consciousness cannot be given, and it is foolishness to seek it. For definition implies science; and science itself, from the psychological point of view, we have seen to be an elaborate collection of related conscious acts. To define consciousness would, then, be to resolve what is most primary and elemental into what is bewilderingly complex, and uncertain.

It is also assumed that conscious processes may be observed and studied, and that, as a result of such consideration, they may be the better understood. The immediate evidence for this assumption lies partly in every one's experience; but fuller proof requires an examination of the method of psychology and of the doctrine of self-consciousness. The treatment of these topics will follow later.

It is further assumed that conscious processes are connected with each other. In some valid meaning of the words, the sequent mental facts are dependent for their character and origin on previous mental facts. Mental phenomena are not chaotic or wholly oblivious of law and order. Since all the ordering of facts and the total conception of law, which "science" implies, are primarily of mental origin, the mental processes, as such, cannot prove wholly disorderly and unsubmissive to law.

It is assumed, finally, that many of our conscious processes — and mental life generally — are dependent upon a variety of external conditions. The common experience of men justifies this assumption. Indeed, without making it, we can scarcely see how experience itself would be possible. It is, of course, unscientific to begin psychology with such an assumption as this: "The immediate condition of a state of consciousness is an activity of some sort in the cerebral hemispheres;" or with any similar statement taken for granted. In a preliminary way, psychology does not even so much as know whether there be any cerebral hemispheres. But the psychologist, like the student of physics or of chemistry, is obliged to assume that "things" do exist, and that they furnish conditions for the origin, order, and character of many of our conscious states. For example, I cannot investigate the mental phenomena of sensation and perception without referring them to the existence and action of the thing perceived by the senses. The whole doctrine of the quality and quantity of sensation, and of the arising and growth of the knowledge of natural objects, connects psychology with physics, with chemistry, with physiology, and with biology.

The ultimate nature of the Mind, the reality of Things, and the actuality of those causal relations which every one assumes to exist between things, are subjects for profound philosophical inquiry. It is, indeed, difficult for the psychologist to avoid introducing such subjects into his discussion of mental phenomena. Without disputing at present as to how far metaphysics is desirable, or even necessary, as an admixture in psychology, we simply insist upon taking at the beginning a naïve and common-sense point of view. There *are* things, — to be perceived, remembered, thought about, known, and acted upon; and in our perceiving, thinking of, knowing about, and dealing with them, these things influence us. There *are* also beings that perceive, remember, think, know, and act upon things. They are called "Minds," and it is the facts and laws of their life which psychology investigates.

Psychology as Science. — After what has just been said, it seems almost needless to raise the question whether psychology can claim for itself a scientific character. If by *science* is meant a system of indubitable facts and laws so established that deductions from them amount to a demonstration, why then there is scarcely any such knowledge in the possession of the human race. Some astronomy, some physics, and a little of chemistry would seem to cover about all. But there is a use of the word "science" which is at once more valid and more generous. Wherever there are facts which admit of fairly accurate observation, and which can be classified and their conditions and interconnections discovered, there is material for a scientific growth. That mental facts can be thus dealt with, no one has a right to deny who has not made himself expert in the use of all the means for studying these facts which the modern age provides. That a body of facts and of generalizations worthy to be called "a science of psychology" actually exists, is sufficiently proved by its literature.

Psychology as Descriptive. — Like all the others of a considerable group of scientific disciplines, psychology has gained its principal successes thus far in the way of enlarging the *descriptive history* of mental life. Description is, of course, the primary thing in laying the foundations of every science. *What are the facts?* We need first to have them accurately and fully described. We need also to have them described in a genetic way; in a way, that is, to correspond with the order of their rise and development. This is the great need, and it is the fundamental achievement of all biological studies. Study of all things that are *alive* has thus far resulted, for the most part, only in an accumulation of descriptive histories. Why the facts are such as we find them to be, and why they are so arranged and connected, it is in general impossible to say. To describe, with keen analysis, helped on by experiment and in dependence upon cognate sciences, the phenomena of consciousness, is the primary aim of psychological investigation. Its principal modern achievements are in the fields of such description. But this aim is subordinate to a more ultimate aim. The supreme final purpose of psychology as descriptive science may be defined as follows: *To give an accurate and full history of the development of that form of life which we call the Human Mind.*

Psychology as Explanatory. — No genuine scientific endeavor is satisfied with mere description. Explanation both accompanies and follows, though usually in a lagging way, the course of descriptive science. In the stricter meaning of the word, *science* begins only when a knowledge of conditions and causes is joined with a knowledge of facts. The psychologist always keeps this aim steadily in sight. He, too, is never satisfied simply to know what the facts are, but ever strives to ascertain under what conditions, and as due to what determining causes, the facts occur. He particularly desires, where this is possible, to establish an accurate measurement and to take the relative values of conscious states; as well as to connect them, in terms of wider and yet wider generalizations, with that varied life of nature which constitutes the environment of the individual mind.

Explanations in psychology may, in general, proceed in any one of several directions; or, rather, each of several directions must be followed in order to obtain the fuller explanation of mental processes.

First, the more elaborate mental processes may be *explained* by analyzing them into the simpler and more elementary processes. For every conscious state, especially of the adult mind, is exceedingly complex. And as the mind develops, the complexity of its processes in general increases. "Explanation" by way of psychological analysis has been compared to the work of the chemist; and there are striking likenesses existing between the two kinds of scientific research. But there are yet more striking differences. For mental processes, such as the more elementary kinds of sensation, ideation, and willing, are not real existences, capable, like the atoms, of being actually separated out of their combinations. The effect upon psychological science of such likenesses and differences as exist between psychological analysis and the analysis of the physical sciences will become more evident later on. It is enough to say here that the words "factors," "elements," "fusion of factors" (or elements) do not mean the same thing in psychology as in physical science. *They are figurative, and are designed on the one hand to characterize the complex content of consciousness, and, on the other hand, to affirm our power of discriminating the different partial aspects of this complex content.*

Second, the physical conditions of psychical processes — such as the external stimuli, the structure and functions of the bodily organism, and the total natural environment — may be studied, and, when discovered, used to explain these processes. This form of explanation renders psychology dependent upon physics, physiology, and biology; and it results in establishing important connections between it and these other sciences.

Third, the psychologist aims to explain the later phenomena of mental life by dependently connecting them with the earlier phenomena. In doing this he is always, indeed, obliged to confess that his explanation is not complete. For there is something other and more in the later stages, where these are also the "higher," than can be found in conditions furnished by the earlier and lower. But, on the other hand, the latter do explain the former, in somewhat the same way as that in which a knowledge of the structure of the young tree or young animal explains the maturer functions of the same being. The key to all such explanation is, of course, the complex conception of "Development." Psychology endeavors to give a systematic exhibition of the general conditions and laws which control the evolution of the mental life of the individual man.

Fourth, psychology is just beginning to recognize the immense influence upon the individual of his social environment. It was this which the lines of the German poet emphasized: —

"Would'st thou make thine own acquaintance,
Then see how other men behave."

Of this entire great truth, the other side is expressed by the same poet in the lines which follow: —

"Would'st thou understand thy fellows,
Of thine own heart take regard."

There is not a mental function of the individual man which is not better understood as dependent upon the social conditions of his birth, education, and daily surroundings.

Problem of Psychology. — The mental life of the individual man is full of unsolved and difficult problems. Every mental process has its peculiar problem, or rather group of problems. He who eats and digests his dinner furnishes the practical answer to questions for which no physiologist has a sufficiently full and unimpeachable theory. The plain man in the daily use of his powers of vision is a puzzle to the psychologist. Normal perception by the senses is no less full of problems than are the illusions of the dreamer or the hallucinations of the hypnotized or the insane. It is with an appetite for hard problems that the student of psychology should approach the subject.

All subordinate problems, however, may be merged in the one great, inclusive problem before psychology. This problem may be stated as follows: *To understand the real nature of that mental life of which all conscious states are members and parts, and to know the conditions and laws which control its genesis and development.*

Method in Psychology. — In spite of much debate over psychological method, we cannot consider this question as worthy of detailed consideration. Indeed, one can scarcely speak with propriety of *the* method in psychology. All means to a more accurate and complete description of conscious states, and to the fuller and more precise knowledge of their external conditions and their interconnections, belong to legitimate psychological method. Those who make a fight for what they call "objective" and "scientific" method as against introspection, or for experiment as against reflection, are not so wrong in what they claim as in what they are inclined to deny. The so-called "new psychology" has no existence as a complete break-off from the old psychology. The laboratory and the study, the "reacting-table" and the thinker's "chair," cannot be kept unacquainted with each other, without injury to both.

Introspection in Psychology. — At the same time there is a way of ascertaining the facts, and, to a certain extent, the conditions and laws of relation between them, which is peculiar to the scientific treatment of mental states. This way, or method, is called "introspection"; sometimes "reflection," or "secondary" or "intentional self-consciousness." True, self-perception is often self-deception. And it has been correctly argued that we cannot even begin to examine our own consciousness, with a view to know its contents, without at once profoundly modifying the very contents we propose to examine. To suppose that what we "think about" our psychoses is a true description of the actually existing psychoses themselves, has fitly been pointed out as chief of the psychologist's fallacies.

On the other hand, the very modification which our activity in self-observation introduces may itself be observed. And he who denies that some sort of "immediate awareness" of one's conscious states is possible runs counter to all human experience. "Surely" — every man affirms with naïve but invincible conviction — "I may know that I have, and when I have, a bodily pain, and whereabouts in the system of bodily localities I am obliged to place it." And how can I doubt that I have thoughts, and what I think about this or that sensible object or abstract question? Only the development of psychological science itself can determine the dangers and safeguards, the risks and fallacies, of the introspective method in psychology.

Reserving further hints for other connections, we affirm, in a preliminary way: *Self-observation of conscious states is able not only to reveal them to us as true objects of knowledge, but also to assist us to analyze those states and to discover their real conditions.* And without self-observation such states can neither be known nor analyzed.

The marked improvement which the training of one's powers of introspection brings about is matter of indubitable experience with the earnest student of psychology. This improvement is especially marked, for example, in the direct analysis of the overtones which it becomes possible to detect in the complex musical sound of ordinary experience. Another good example is found in the experience of those who carefully observe their skin sensations, with a view to separate the different elements which blend in the case of what is called "feeling" things with the hand. Undoubtedly our so-called "feelings" in general are very difficult of description and of scientific treatment. But this is not because we are not immediately aware of them in any trustworthy way. On the contrary, it is of our present feelings, especially when they are obtrusive and strong, that we are most directly and unequivocally aware.

Experiment in Psychology. — While a certain amount of experiment has always been connected with investigations in psychology, the use of carefully prepared and closely guarded experimentation is a very modern achievement. The value and success of the so-called experimental method ought not to be questioned. At the same time, its devotees are tempted to exaggerate its promise and its superior productiveness. It certainly can never be pursued without dependence upon introspection. And it is easier, perhaps, to excel in the manipulation of mechanism than in the trustworthy report of the content of consciousness, as indicated and measured by the mechanism. Moreover, it is only the comparatively simple sensory-motor activities, the less complex and subtle associations, and the more elementary forms of feeling and choice, which lend themselves readily to experiment.

In spite of the lengthy and heated debate which has been carried on over the use of introspection, and over the method of psychology in general, there is really little chance for an intelligent and wide difference of view. Physiological and experimental psychology can no more dispense with introspection than can the most old-fashioned kind of the so-called "old psychology." But, on the other hand, physiology and experiment have contributed much the larger part of the assured and permanent recent additions to psychological science. Again, when Volkmann rejects both the inductive and the deductive methods and introduces what he calls the "genetic" method, he can carry out his own way of handling mental phenomena only by virtually using the methods he rejects. On the other hand, the "genetic" method, or study of the genesis and development of individual mental processes and of the whole mental life, is characteristic of modern psychological science; as it is, indeed, of all the modern sciences. Some of the most distinguished followers of this method, however, — as, for example, Herbart and his successors in Germany, and Herbert Spencer and his adherents in Great Britain and this country, — have misused this method by substituting their own theoretical abstractions for the actual and living activities of the mind.

Doctrine of Psychological Method. — The complete circle of means to be employed in realizing the aims of mental science embraces observation, analysis, induction, and the framing of theories, — to be tested, when this is possible, by experiment. In other words, the method of psychology is (1) observative of facts, (2) analytic, (3) inductive, (4) genetic, or pursued as a study in development. Observation of conscious states is direct or indirect; the method of the former is introspection; the method of the latter is, in general, interpretation of physical signs. The one is sometimes spoken of as an envisagement of one's own mental processes; the other is an inference from the behavior of others as to what their mental processes are. Analysis, induction, and the framing of a theory of connections between the facts, and of the laws of the development indicated by the facts, are not, as methods of investigation, peculiar to the science of psychology. The scientific method is, however, possible in the study of mental processes, because these processes admit of analysis, induction, and theorizing, on the basis of careful and guarded observation.

Sources of Psychology. — To enumerate all the springs of information and suggestion open to the student of psychology would require a survey of the entire field of human mental life. His one constant endeavor is to note every manifestation of mind, to make it an object of knowledge, and to explain it in accordance with other facts and known laws of mental life. From the new-born infant to the philosopher Kant, from the idiot or madman to Aristotle, all human conscious processes constitute the field of his science.

In connection with introspection and experiment, where the latter is possible, the following sources of psychology may be noted: (1) The artistic delineations of human mental life. These include the drama, poetry, and especially, at present, the novel, or prose romantic composition. All true art requires and displays insight into soul life. It is not, however, the so-called "psychological" dramas or novels which ordinarily have most of genuine and valuable insight.

(2) Social phenomena, and the historical and theoretical discussion of these phenomena, furnish valuable material to the psychologist. The institutions, customs, laws, of different peoples and eras, should be studied as the outcome of their unfolding mental life. Breadth, caution, and sympathy are particularly necessary here. For while "race-psychology" is an important branch of the general science, and a necessary connection exists between it and that complex of facts called "anthropology," it is not a Puritanic, or a Teutonic, or an Oriental, but a *human* psychology, which we seek.

(3) In psychology, as in physiology and in biological studies in general, abnormal and pathological phenomena require expert investigation. Such investigation is often a fruitful source of psychological knowledge. Hence the value of studies in hypnotism, insanity, criminology, idiocy, etc., for the science of psychology.

(4) Observation of the mental processes of infants and

children, and even (5) of the lower animals, is necessary to a better analysis of the mature mental processes of man, and to the detection of hitherto concealed factors within them. Such observation is indispensable to the understanding of human mental life as being what it undoubtedly is — a *Development*.

But, finally (6), the student of psychology can no more easily than can the student of any modern science dispense with the reading of treatises which record the results of other's observations and reflections. For this science, too, grows at the hands of many workmen, and he who attempts it in isolation from his fellow-workmen is certain to deceive himself with a pretence of knowledge.

In this brief treatise, no attempt will be made to employ the different methods, or to draw from the different sources, so as to emphasize the distinctions that exist between them. We shall give a brief description of the mental life of the individual man, — its chief processes and its history in development, — availing ourselves on each topic of the results of all the different methods and sources.

Divisions of Psychology. — The entire field of psychological inquiry has been variously divided. A division which was for a long time prevalent recognized two disciplines: Empirical Psychology and Rational Psychology. The former aimed to treat mental processes as themselves objects of experience, and so to establish a descriptive science of these processes. The latter discussed the more speculative problems entering into a theory of the Mind as the really existing subject of mental states. The distinction is valid and should be recognized by all students of psychology. But no author who has treated of the entire "round" of the mental life has succeeded perfectly in carrying out the distinction. *The study we propose is to establish a science which is mainly descriptive, but also explanatory, on the basis of undoubted facts of experience.*

This is empirical psychology, or psychology as a "natural" science, in the widest meaning of the adjective. But among the explanatory assumptions, certain positions as to the real nature of mind and of things, and of the relations between them, are almost unavoidable.[1]

Since the time of Kant the field of empirical psychology has customarily been divided among the three so-called "Faculties" of Intellect, Feeling, and Will. For reasons which will appear in their full force later on, and especially because we wish to emphasize the scientific method of analysis and the conception of development, we shall reject this division. We shall treat of the phenomena of consciousness under two general heads: (1) Mental Processes and (2) Mental Development. The first division will discuss those elementary forms of conscious experience which the analysis of psychological science discovers in each and every condition of human mental life. The second division will trace the growth of mind in various directions, as these elementary processes become more varied in combination and richer in achievement.

Doctrine of Mental Faculties. — The so-called "old psychology" has been accused of making a misuse of the doctrine of mental faculties. And, although the accusation has too often been excessive, it is not without justification. It is nearly equivalent, however, to saying that the earlier forms of this science were obliged to content themselves, for the most part, with classification. Previous to modern investigations, psychologists could do little in the way of scientific explanation. They could only say, thus and so the mind behaves; it perceives, remembers, imagines, thinks, feels, and wills. Of course, if such activities were referred to the mind's "having a

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[1] For a full discussion of the metaphysical problems, the student may be referred to the author's Philosophy of Mind, Charles Scribner's Sons, New York, and Longmans and Co., London, 1895.

faculty" of perceiving, remembering, thinking, etc., this was to confess ignorance of their real causes. Psychological science aims to know under what conditions the mind perceives, remembers, thinks, this rather than something else; and to estimate and approximately measure, as it were, such conditions.

Important truths, however, which the modern psychologist cannot afford to overlook, were implied in the ancient doctrine of faculties. First of all, this truth: *All classification of psychic facts, as immediately known, is accompanied by an implied or express assignment of them to the same Subject of all.* This truth will be more fully set forth in the following chapters.

The basis for the doctrine of mental faculties consists in the fact that the complex experiences of our daily lives differ greatly in their more important characteristics, and yet that characteristically like experiences are frequently recurring. For example, we are suffering with toothache or headache, one day, and another day, we are enjoying ourselves in the open air or in some social gathering. Still another day, we are engaged in thinking out some problem; and on a fourth day, we are largely given up to remembering or to the play of imagination. The first and the second characteristic experiences agree in that they are both forms of "feeling"; but they are diametrically opposed in that one is painful and the other pleasurable. The third and fourth experiences are unlike either of these forms of feeling and yet agree in being intellectual activities. As intellectual activities, however, they have markedly different characteristics. Since, then, all so-called "elements," or "factors," are the modes of the functioning of one Subject, what more natural than that the various principal modes of its functioning should be spoken of as the "capacities," "faculties," or "powers" of this one Subject? The language of common life, in which we always find the embodiment of genuine psychological truth, indicates the necessity for doing this.

The Mind a Unity. — That some sort of unifying must be admitted for every "stream of consciousness" which comes to be called a "Self," the popular voice and the science of psychology agree in asserting. As to the nature of this unity, the philosophy of mind finds one of its most interesting problems. The science we pursue, however, notes these two truths as facts underlying the empirical unifying of mental processes: —

1. *Every psychic fact is actually complex with an irreducible threefold complexity; it is, at the same time, a fact of intellection, a fact of feeling, and a fact of conation.*

2. *All the more elaborate mental processes, and the different so-called faculties, must be considered as resulting from the development of mental life by the combination and elaboration of the elementary psychical activities.*

Psychology and Other Studies. — What has already been said as to the nature of psychological science, its sources and its methods, must serve to suggest its relations to the other particular sciences. To all the sciences of man it is introductory, fundamental, indispensable. With all the biological sciences its connections are most intimate and mutually helpful. With the other forms of science its relations are more remote. But with what is called "Philosophy" its relations are so intimate that one of the greatest of modern psychologists (Wundt) has justly declared: "The partition of sovereignty between the two is an abstract scheme, which, in the presence of actuality, always appears unsatisfactory."

We conclude, then, from this introductory survey of our field: —

1. Psychology is a science, because the processes and development of man's mental life admit of accurate description and of a certain amount of explanation, by discovery of the conditions under which they arise and of the laws that regulate their occurrence.

2. The method of this science is, like that of every other science, complex, and is to be learned only by a growing experience. It is peculiar, however, in that every special method employed must be accompanied by intro-

spection and followed by reflection upon the significance of the facts in their relation to the one Subject of them all (the Mind).

3. The important connections of psychology with other sciences are almost universal; but they are especially intimate with the biological sciences, and above all with the sciences of man. Psychology is also the one indispensable propædeutic, or introduction, to those more ultimate problems of human reflection which concern the discipline called "Philosophy."

[On the Nature of Psychology, see Sully: The Human Mind, I, chap. i; Baldwin: Handbook of Psychology, I, chap. i. On psychology as a so-called "Natural Science," see James: The Principles of Psychology, I, chap. i, vi, vii, and *passim* in both vols. On Method in Psychology, consult also J. S. Mill: Logic, bk. VI, chap. iv, and Rabier, Leçons de Philosophie, I, La Psychologie, chap. iv. On Experiment in Psychology, see Scripture: The New Psychology (throughout). As studied from the comparative point of view, Wundt's Lectures on Human and Animal Psychology (translation by J. E. Creighton and E. B. Titchener) is especially to be recommended.]

PART FIRST

THE PROCESSES OF MENTAL LIFE

CHAPTER II

CONSCIOUSNESS AND ELEMENTARY SELF-CONSCIOUSNESS

Meaning of the Term "Consciousness." — Obviously the psychologist is in need of some term that will apply to all the phenomena alike, out of which he proposes to construct his science. This term we took the liberty of supplying when these phenomena were, in the definition, said to be "phenomena *of consciousness*," or conscious states and processes. In the same connection the admission was made that, from its very nature, consciousness cannot be defined. It may be described in some sort, however, by setting it into contrast with "the unconscious." What we are when we are awake, and what we are not when we fall into a quiet dreamless sleep; what we are as we go about our daily work, and what we are not when an overpowering blow upon the head is received,— that it is "to be conscious." Or, again, what diminishes as we pass into some form of stupor and increases when we are aroused from the stupor, that is "our consciousness."

Unconsciousness psychologically Inconceivable. — It is at once apparent that we can frame no picture of "the unconscious" as a form of mental life. In other words, the conception of unconsciousness is, for psychology, a negative conception. About such a condition or mode of being one can only say, it is *not* a conscious state or process; it is *no* mental or psychical event. Total unconsciousness is the complete absence of all psychoses. Now by the study of conscious processes, *as such*, but especially by investigation of their conditions and constituents, it may be possible to establish the theory that the mind is capable of other activities than those which manifest themselves "in consciousness." But such theory can never divest itself of the necessity of using terms of conscious experience. Wherever we can discern or infer *conscious* states and processes, there we have phenomena upon which psychological science may throw its lights. But for psychology the unconscious is the denial of the truly psychical or mental.

Conscious States. — What is meant by *a* conscious state or process may now be made somewhat clearer. In the flowing life of the mind no fixed parts can be marked off, as is the case with objects extended, or with changes occurring, in space. Nor does the mental life so flow in time that its moments can be separated by cross-lines, as it were, between which the separate states or processes are located. Abrupt changes in the character of these states do, indeed, not infrequently occur. We are certainly in a quite different "state of mind," when just stung by the bee lurking in the flower, from that in which we were a moment before while admiring the flower's beauty.

In general, however, it is obvious that one's mental life has considerable continuity and smoothness of flow. When "deep" in thought, as it is so expressively said, it takes time and a strong pull to get us up and out of our thoughts into some form of bodily action. When "suffering under" a strong emotion, we usually have to get gradually over into a condition of predominating thoughtfulness or of deliberate choice.

Continuity of Mental States. — It is probable, if not absolutely certain, that there is never a complete break between two successive processes or conditions of the mental life. At each moment, that is, the complex of consciousness includes within itself the lingering phases or "reverberations" of the just previous conscious state. And the present complex, in turn, holds anticipations of, germinal contributions to, the coming conscious state. This principle of continuity which connects the different moments of the conscious life may be illustrated in several ways. What goes on in the field of a slowly revolving kaleidoscope affords an illustration. Or let the series of so-called "states" be represented by $A, B, C, D, \cdots, N$; then, since $A=(a, b, c, d, e, \text{etc.})$, $B=(c, d, e, f, g, \text{etc.})$, $C=(e, f, g, h, i, \text{etc.})$, and $D=(g, h, i, j, k, \text{etc.})$, the change of conscious states may be represented by a flow of $(a, b, c, d, e, \text{etc.})$ into $(c, d, e, f, g, \text{etc.})$, into $(e, f, g, h, i, \text{etc.})$, and so on. Or, perhaps better still, the same truth might be illustrated by the way the successive areas enclosed within the line drawn by a point on the disk of a wheel, that enlarges and contracts as it moves forward with a varying rate of speed, would include portions of each other. To take a concrete instance: a picture of a star-fish is seen; a visual image of dried star-fish is aroused; this seems to be placed in a box; and a memory of a particular star-fish actually seen some ten years ago follows, etc.

Discriminating Activity applied in Conscious States. — So far as can be discovered, human consciousness is never merely a passive area for the reception of impressions. The simplest forms of conscious life are mental activities, as well as modifications of that life by conditions outside of it. And the so-called "states" or "processes" of mind do not separate themselves, as atoms leave their old relations and enter into new relations with other atoms for which they have the greater affinity. As *conscious* states or processes, they must be separated, and recognized as apart, by mental activity. This primary "discriminating consciousness" is the prerequisite of all distinguishable elements or states of consciousness. A pain that were not recognized as a conscious pain would not be a pain at all, in the psychological meaning of the word. It could not be a psychosis, it could only be a physiological condition of a psychosis to be expected. On the other hand, *consciousness*, so far as it can be made the object of psychological investigation, *is synonymous with psychical state, regarded as discriminated, however faintly, in respect of content, and related, however imperfectly, to the stream of mental life.*

At this point the following quotation (Philosophy of Mind, p. 85 f.) emphasizes a matter of the utmost importance to the science of psychology: "It is a most important fallacy in much of the current psychology to assume that the whole of any mental phenomenon is described and explained when the mere '*content*' of consciousness has been described and explained. . . . Of course, no psychosis can be scientifically treated in neglect of its description and explanation, content-wise. For a psychosis without content is equivalent to no psychosis at all." But another aspect, a different "potency," equally belongs to all the phenomena of consciousness. "*For all consciousness, and every phenomenon of consciousness, makes the demand to be considered as a form of functioning, and not as mere differentiation of content.* Phenomena of consciousness are always conscious activities, as truly as they are contents of consciousness. Consciousness is itself consciousness of activity — fundamentally so; and it is so all the way through from the lowest to the highest and most developed forms of functioning."

Whatever unity any complex mental state possesses must be imparted to it, so to speak, by so much of discriminating consciousness as is in it. This will appear more clearly when the nature of attention and discrimination, as mental activities, has been discussed. It is sufficient now to note that without these activities being admitted, the very term "states of consciousness" has no intelligible meaning. Admitting the presence of such activities, we arrive at the following conception of "a state of consciousness": *It is such portion of the actual life of consciousness as may be, by discriminating activity of consciousness, considered as a unity, both with respect to its own so-called constitution, and also with respect to its relation to other states of the same life.*

"Field" of Consciousness. — The use of a convenient figure of speech enables us to speak of different "fields" as distinguishable in the conscious life of mind. Several features of our most undoubted experiences are emphasized in this way. Among these the more important are the following: (1) Some so-called conscious states are richer in *content* than are others; they have more of thoughts, feelings, and of striving and doing compressed into them, like a given area of a thickly sown and thrifty field of grain. (2) Some conscious states extend over more time than do others, — this time being measured by the "*grasp*" of discriminating activity that has just been referred to as necessary to effect the unity which all conscious states must have. The amount of the field brought under the surveyor's eye is not the same at all times. (3) Different conscious states change their more prominent characteristics with varying *degrees of rapidity*, as the fields lying beside the railway change when the speed of the train is increased or slackened. But the one important thing to observe is (4) that the very word "field," in its most figurative use for the psychologist's purpose, implies that something corresponding to the surveyor's eye seems everywhere to be implied. It is this fact which leads some students of the science to claim that there is no such thing as human consciousness which does not involve at least a rudimentary *self*-consciousness.

The word "consciousness" has been used by different psychologists with a considerable range of meanings. Some (Porter: The Human Intellect, p. 83) have identified it with self-consciousness as the "power by which the soul knows its own acts and states." Others have used the word as an "inner witness" or "inner light" (Cousin and Hickok). Sir William Hamilton employed it as a collective term for the cognitive aspect, or factors, of psychical states. On the other hand, many German writers, and modern psychologists generally, argue against identifying consciousness and self-consciousness. They deny that we must believe every psychic fact to have all this mechanism concealed in its interior. They ask for the evidence of this universal *double entendre*, or twofoldness of all our conscious states. In some cases, however, this lively protest against the old-fashioned view of the presence of self-consciousness in all consciousness — even that which has reference to external things — is apt to be followed by admissions which, in a measure, refute the other extreme position. Not infrequently these admissions come to this: "Consciousness is the condition in which we not only have the content of the idea in the soul, but also *perceive* or remark the same" (Fortlage). The truth seems to be that, although consciousness may properly be identified with all psychic facts as mere occurrences, psychic facts cannot be known as such, without involving at least inchoate and confused self-consciousness. The beginning of self-consciousness is consciousness considered no longer as *bare* psychic fact, but as discriminating its own state and relating this particular state to others in the stream of conscious life.

Physical Conditions of Consciousness. — Biology and human physiology and hygiene have recently thrown much light upon those conditions of the body, and especially of the brain, which determine the occurrence and nature of conscious processes. These conditions are, in general, the integrity of the nervous system, with its threefold arrangement of end-organs, connecting nerve-tracts, and central organs. Among the central organs, it is the brain on whose functions the conscious life of man is chiefly and directly dependent. The brain-centres must be supplied with properly oxygenized arterial blood. If circulation of such blood is stopped, consciousness ceases. If it is corrupted with drugs or products of diseased tissue, the characteristics of the conscious states are profoundly modified.[1]

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[1] For a fuller discussion of such topics, see the author's Elements of Physiological Psychology, and Outlines of Physiological Psychology.

Moreover, all consciousness apparently involves a certain heightening of molecular activity in the brain-centres. Thus there is reason to apply the general biological law to the physical conditions of our conscious processes. *All activity of tissue is conditioned upon its being decomposed and then regenerated by nourishment. Intensity of consciousness depends upon intensity of neural function; the latter depends upon intensity of the work of decomposition, and is inversely as the ease and rapidity with which the inner work of one nerve-element is transmitted to another.*

The sensitiveness of the nervous mass to the most delicate external stimuli is almost incredible. The sensitiveness of the mind's reactions in consciousness to the agitations of the mass by these stimuli is also marvellous. Thus Haller noticed that the noise of beating a drum increased the flow of blood from an open vein; and Mosso observed that the approach of a lamp toward a patient whose brain was exposed increased the volume of the brain-substance. M. Payot claims to have seen the respiratory rhythm and pulse-rate of a sleeping infant changed by the passage of a cloud over the sun; and M. Féré found that even slight sensations of sound and smell affect a man's dynamometric force. How amazingly delicate are some of our sensations will appear later on.

A practical lesson, of especial value to students and teachers, is taught by these facts. The physical mechanism with which they are dealing is the most complicated, sensitive, and wonderful thing in the world. In some respects, it is most manageable and enduring. But its exhausted patience is difficult of recovery and its wrath of long standing is not easily appeased. And while it will do an enormous amount of work, if well nourished, properly rested, and kept as free as possible from violent or secret emotional frictions, it will not overlook or forget violations of the laws under which it performs its functions.

Characters of Different "Fields" of Consciousness. — Nothing is more impressive to the persistent student of psychology than the immense complexity of conscious processes. All study of psychology serves to illustrate this truth: —

In developed mental life every conscious state must be regarded as resulting from an immense number of factors that form a sort of organic unity.

It has already been urged that, when we speak of mental *factors* or *elements* as existing in "a sort of organic unity," we must not understand these words in such manner as to mislead our conception of the real nature of every conscious state. As Professor James has said: "Whatever things are thought in relation are thought from the outset in a unity, in a single pulse of subjectivity, a single psychosis, feeling, or state of mind." But the other side of the truth has been well expressed by M. Paulhan: "Every psychic fact is a system — a synthesis of facts more or less perfectly coördinated."

Putting both truths together, we may assert, on the basis of every man's experience, what psychological science illustrates and demonstrates; namely, that different so-called "fields of consciousness" differ in respect of (1) circuit or extent, (2) intensity, (3) time-rate, (4) specific, complex quality.

Extent or Circuit of Consciousness. — The old-fashioned psychology agreed with Mr. Spencer's equally *a priori* and unwarrantable conclusion, in thinking that only *one* object can be present in consciousness at the same time. Experiment shows that this restriction of the *grasp* of consciousness as a discriminating activity is incorrect. The time-moment of consciousness is not like a mathematical point; it always includes a survey of a *field* of more or less circuit or extent.

Different sensory impressions, under a variety of changing circumstances, may be "grasped together" in consciousness with a clear discernment of their existence as different in the same field. With the most favorable interval (0.2–0.3 sec.), one experimenter found the maximum even number of successive impressions of sound which could come under one mental "grasp" to be 16, the maximum odd number, 15. Professor Cattell tested the "grasp of consciousness" by displaying from 4 to 15 perpendicular lines for 0.01 sec. Of 8 persons experimented with, 2 could discern correctly the number seen up to 6, but none beyond 6. Dr. Krohn's experiments showed that 5 or 6 tactual impressions, occurring simultaneously, could be more or less imperfectly localized in one field of consciousness; but, in most cases, the surplus of a larger number either "fused" with one another or dropped wholly out of consciousness.

Different persons differ widely, as everybody correctly believes, in their mental grasp. We recall how David Copperfield wandered about London streets stupefied with grief, and yet noticing the minute details of surrounding objects. Frederick the Great boasted of his father that he died with the "eye of consciousness" turned, like that of a scientific observer, upon all the phenomena of dying. Any theory which reduces the difference in conscious grasp, between Aristotle and Peter von Hackländer,—the stupid soldier who could never recall at one time more than two of the three constituents of gunpowder,—to difference in time-rate of conscious processes, is surely absurd.

Intensity of Consciousness. — Different fields of consciousness differ, in some recognizable way, in the amounts of *psychic energy* which characterize them. We all live more in one minute, at certain times, than in many minutes of ordinary daily experience. This difference, too, is not to be resolved into one of time-rate merely. Indeed, nothing is more characteristic of mental life than the unceasing changes in the intensity of energy which it displays.

So marked and observable are the characteristic intensities of different fields of consciousness that we can easily imagine some kind of a scale for measurement set up, and a resulting tabulation along that scale of the successive fields. As has already been indicated, *the life of consciousness undergoes rhythmic changes in intensity.* This truth will be further illustrated when we come to treat of attention and of its variations.

Time-rate of Consciousness. — The *speed* of mental processes varies, within given limits, in dependence upon a variety of conditions. This is true as respects both the rate at which the individual conscious states form themselves, and also the rate at which they succeed each other in the stream of consciousness. In the first place, — *a certain amount of objective time is required to form any field of consciousness,* — "*to come to consciousness*" at all, as we are accustomed to say. This is true of sensation, perception, memory, association, choice, or whatever may be the predominating characteristics of the particular field. And there is probably a particular time for every individual which is most favorable for the formation of all elaborate and clearly discriminated conscious states.

The time required for the perfection of mental processes increases, in general, as the degree and amount of discrimination and choice entering into them are increased. To explain, suppose that we divide different mental processes as follows: (1) merely having sensations with a *minimum* of discrimination as to what the "significance" of the sensations is; (2) perceiving things as having such or such characteristics, — a higher degree of discriminating consciousness (sometimes called "apperception"); (3) more or less deliberate choice as to the direction of attention, or as to what we will do with the things apperceived. Then we may say: Perception requires more time than merely having sensations, and, among perceptions, those which have in them most of apperception; but if choice is required as a part of the mental process, then yet more time must be allowed.

To illustrate definitely: To signify by some simple reaction (such as pressing a key) that one is having a sensation requires 0.1–0.3 sec. Different sensations require different fractions of a second to form themselves clearly in consciousness. Thus Goldscheider found that temperature sensations come to consciousness later than those of contact, and that cold is perceived much quicker than heat. The difference increases with the distance of the stimulus from the brain, and it may in certain extreme cases amount to 0.5 sec. The whole subject is well illustrated by the experiments of Baxt. He found that if a disk with letters on it be displayed, and then quickly followed by a white disk, when the interval between the two is about 5 σ (σ here, and elsewhere, signifies 0.001 sec.), the first disk is seen as a trace of a weak glimmer. At 9.6 σ interval, letters appear in the glimmer, one or two of which can be partially recognized at 14.4 σ. Four letters can be well recognized at 33.6 σ; and six letters at 52.8 σ.

The stream of consciousness, the succession of conscious states which make up the life of consciousness, flows with varying degrees of rapidity. "Fast living" is no unmeaning figure of speech as applied here. "Slow coaches" is a slang phrase, but not inappropriately used for some minds. Three truths should be borne in mind on this subject: (1) The speed in development and in succession belonging to different series of mental states is different for different classes of states. This has already been sufficiently illustrated. (2) In general, the time-rate of consciousness depends upon a large number of not easily calculable factors; yet it has its maximum and its minimum. (3) Different persons, under similar circumstances, show different time-rates for the movement of the conscious life. They are "fast," "moderate," or "slow"; but no one can exceed certain limits of the human mind.

The simplest kind of sensory-motor reaction can scarcely require less than 0.1 sec. The most elaborate processes can scarcely hold their own in consciousness so as to retain the unity of one state for more than ½ sec. We cannot dwell long on any fairly self-identical object with the eye of discriminating consciousness. The mind's clock takes time to tick; but its life is a succession of more or less clearly distinguishable ticks.

Quality of Consciousness. — It has already been claimed that all the fundamental "faculties" are employed in every complex mental process. It has even been claimed that "every psychic fact is a system." To quote Dr. Ward: "The most elementary facts of mind cannot be expressed in less than three propositions: I feel somehow, I know something, I do something." We cannot remember or think without both feeling and willing. Yet just as plainly the different fields of consciousness differ widely in their characteristics. This difference is emphasized in the language used by all men to describe their experience, and to express the changing relations in which they figuratively regard themselves (the *Ego*, the Self) as standing to the differing experiences. Thus they speak of themselves as "buried in reverie," "lost in" painful or sweet memories, "plunged in" thought, "carried away" with appetite, "swept by" storms of passion, "driven by" impulse, or as "exercising control over" their own emotions and practical lives. How wide the difference, for example, between the sensuous and the repentant moods of the Magdalene, between the philosopher reflecting over the mysteries of ultimate Being and the philosopher enjoying his dinner, between Alexander drunk and Alexander sober. How immense the range of characteristic qualities between the conscious states of the most gifted and the most stupid, or between the purest saints and the most wretched sinners.

Relations of Extent, Intensity, and Time-rate. — Intimate and varied interrelations exist between the different prominent characteristics of the changing conscious states. Especially is this true of the circuit, the energy, and the speed of consciousness. In all expenditure of psychic energy, the time-rate, the intensity, and the number of objects over which the aggregate of disposable attention is distributed, are, indeed, so interdependent that they may be conceived of as functions of the one mind and capable of statement in something like the terms of a mathematical formula. Intense thought, or feeling, or action requires time; clear discernment bears some proportion both to the complexity of the object submitted for mental analysis and to the time allowed for that analysis. *Some* attention can be given to several objects in the one field of consciousness; but "absorbing" attention can be given only to one central object (the object in the "clear-spot" of the mind's field of vision), and this for only a brief time. So with the psychic energy involved in conscious movements.

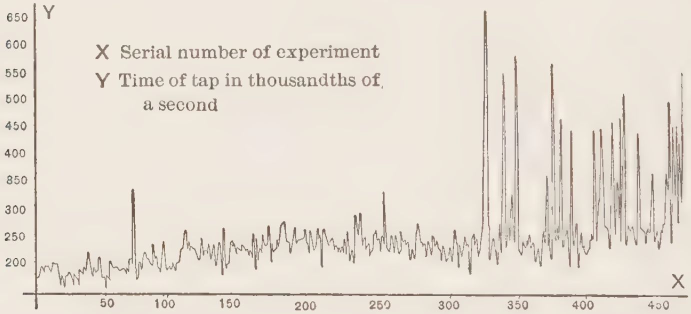

FIG. 1

In this connection it is pertinent to call attention to certain *fluctuations of consciousness* which exhibit themselves as changes in the intensity, time-rate, and precision of voluntary effort. For example, let any one be required to tap a telegraph key continuously and at a very rapid rate, the time occupied by each tap will undergo continual changes. Fatigue will show itself not so much in the increase of time required for each tap as in the increased extent of the fluctuations. [For a typical record, see the accompanying Fig. 1.] Similar fluctuations are observed in dynamograph records.

The larger fluctuations in the strength of our conscious efforts may be regarded in a similar way. We are required to give a series of strong grips in quick succession; they steadily decrease in strength until a condition of temporary paralysis sets in; then follows a partial recovery; then another paralysis; and so on. To quote from Dr.

Scripture (The New Psychology, p. 229): "When the paralysis occurs the grip does not sink to zero, but remains at a medium point. During the whole experiment I conscientiously gripped as hard as possible. . . . At the points of paralysis I could not even *will* the grip. I felt a complete mental paralysis and did not suppose that I had gripped at all. On the other hand, I did not suppose that I had relaxed the grip. A kind of mental daze came over me at the points of paralysis." Similar conditions probably occurred in the ergograph experiments of Mosso and Lombard, although they were not observed and recorded.

Elementary Self-consciousness. — We cannot speak of developed self-consciousness except as the result of the development of all the powers of the mind. For the infant there is no "self," and there are no "things," in the meanings which both self and things have for the adult consciousness. Neither can we admit any so-called faculty of self-consciousness as a special work of the mind in forming the conception of self, or in attaining the higher degrees of self-knowledge. It is the same mind, using its same growing powers of discrimination, which comes to distinguish things and self, and to acquire, by comparison and contrast, its mental images and its conceptions both of its self and of other selves and of things.

Our views can be made clearer only as the subjects of attention and discrimination are discussed, and as the facts and laws of that mental development which ends in the knowledge of Self and the knowledge of Things are traced. Obviously, however, consciousness and self-consciousness are not the same. When I am looking intently through a microscope, or watching some absorbing spectacle, or hearing interesting music, I am highly conscious — all alive mentally, so to speak. But I am little, or not at all self-conscious. Neither can it be claimed that the tracing of every conscious state, as such, involves the explicit, or clearly conscious reference of that state to the *Ego* or Self. Certainly, there is in the beginning of the child's mental life no mental picture of a Self, and no already formed distinction between Self and things. This distinction itself is established, this picture formed, as the result of development.

Two things must, however, be admitted to be true of even the most rude and inchoate mental life of every human being: (1) A certain emotional tinge of the most obtrusive experiences, a coloring from *self-feeling*, so to say, belongs to the simplest beginning of conscious states. (2) The stream of consciousness cannot be broken up into states, in any such way as to become either the subject of psychological investigation or representable in adult consciousness, without the "discriminating consciousness" of the subject of these states being active. Attention, discrimination, self-feeling — these seem to belong to all conscious mental life.

While we must postpone the fuller account of self-consciousness until later on, enough has already been said to emphasize these important truths: —

First, That "stream of consciousness," which is but the life of the mind beginning and growing in its own unique way, is the one source from which we must draw our account of all the different conscious processes and of the devolopment of all the so-called mental faculties. To be conscious is to have psychic life. In the germinal psychic life all the elementary forms of psychic functioning are involved, such as attention, discrimination, sensation, feeling, conation, ideation. The growth of this life into higher forms of activity involves and employs them all.

But, second, we shall see how the fundamental and all-important distinction between *my self* and *not-my-self* — or "other things" — is the leading feature in the development of the psychic life. The grounds for this distinction are found in strongly characterized differences in the different conscious states and different elements of conscious states. These differences, however, do not distinguish and segregate themselves, as it were, after the manner of atoms in solution, proceeding to crystallize according to chemical laws. An active *discriminating* side must be admitted as belonging to all these most elementary processes, and an emotional coloring, which may be called self-feeling, accompanies the function of active discrimination.

Finally, out of this beginning life of feeling and discrimination, as it were, and not as something foreign to the earlier and simpler conscious states, the most elementary self-consciousness emerges. It is accompanied, however, from the first by the growth of perceptive consciousness of things. To trace this complex development is to follow, in a historical way, the development of the mind. But it requires a further preliminary analysis to describe and explain the other particular kinds of elementary conscious processes.

[Compare Professor James' chapter on "The Stream of Thought": The Principles of Psychology, I, ix; and Sully: The Human Mind, I, p. 72 f. Further special investigators would profit by reading the monographs, in German, of Ochorowitz (*Bedingungen d. Bewusstwerdens*, 1874); Lipps: Grundthatsachen d. Seelenlebens; and, more recently, of J. C. Fischer, J. L. A. Koch, Schuster, Wahle, and others.]

CHAPTER III

ATTENTION AND DISCRIMINATION

Attention as so-called "Faculty." — Our customary language makes a distinction which all adults readily understand. This distinction may be emphasized by reflecting upon the difference between such words as "hear" and "hearken," "see" and "look," etc. The latter of the two couples of words (namely, "hearken" and "look") are used in command and exhortation; they imply an ability on the part of the mind to control the conscious processes. Hence this ability has sometimes been spoken of by psychologists as a special faculty. And by the so-called "faculty of attention" is then meant *a purposeful volition, suffused with peculiar feelings of effort or strain, and accompanied by a changed condition of the field of consciousness, as respects intensity, content, and clearness.*

Plainly, however, this use of the word attention includes the results of the development of several primary forms of mental functioning. In attending I am feeling somehow, knowing something, and doing somewhat. That is, I am conscious in a definite way, and I am having something to say about the way of my being conscious. But these assumptions require further examination.

Attention as Primary and Universal. — The acquirement of the faculty to attend, "when and as we will," presupposes attention as a primary and universal phenomenon of consciousness. *Some*, and *some kind of*, attention belongs to every mental state or process. What is ordinarily called "*in*attention" is not the negation of all attention; it is rather diminished intensity of attention, or attention directed to other objects than those which seem proper under the circumstances. The idle schoolboy is inattentive to his lessons, because he is attentive to objects outside the window, or to memories of past play-time, or to plans for the coming holiday. The foundations of a scientific psychology can be laid only if we admit the conditions and laws of this universal experience: *Primary attention is a form of psychical activity which enters into the determination of the character of every field of consciousness. It is a most general form of all mental life.* In the figurative language of Professor James: "It (the 'stream of thought'=the mind) is always interested more in one part of its object than in another, and welcomes and rejects, or chooses, all the while it thinks."

Physiological Conditions of Attention. — The changes which go on in the nervous centres, in the so-called psychic nerve-cells and nerve-fibres, are very significant in their bearing upon the psychological doctrine of attention. In diseases of the brain, where there is impaired integrity of its substances or an abnormal condition of the blood-supply, the sufferer finds it difficult or impossible to control the stream of consciousness, as sound men ordinarily do. Sometimes so-called "hypertrophy of attention" takes place, and *one* idea, *one* feeling, *one* fancy, persistently usurps the central part of the field of consciousness. It continually forces the attention of the patient upon itself. Or, again, there may be impotency to attend with ordinary fixity to anything. "The current of ideas is so rapid and exuberant that the mind becomes a prey to unbridled automatism." The lower animals which have lost important parts of the brain-areas show the effects of this loss by changes in the power of attention. The "soul-blindness" and "soul-deafness" (or seeing and hearing, but *without interpreting the meaning* of what is seen and heard) of the dog which has lost part of its cerebral substance is partly due to inability to attend to the object of sight or of hearing. Nothing is more distinctive of idiocy or of general paralysis than impotency of attention. These observations show that *attention, or the focusing of psychical energy, involves increased activity in certain brain-centres, — a "focusing" of physiological function.*

Attention, which is itself the indispensable prerequisite and accompaniment of all mental work, implies work being done in the brain. Experiments in reaction-time illustrate this. If the reacting agent is taken "off guard," — that is, if his attention is not properly focused when the signal is given, — he reacts more slowly and irregularly. If he is warned, and so is found "on guard," he reacts most promptly and regularly. Promptness and regularity in reacting depend upon just the right time (not too little or too much) being allowed for the "focusing" of attention. Thus Wundt found that when one is warned at what instant to expect the sound of a falling ball, the time necessary to discern the sound may be reduced from 253 σ to 76 σ, if the ball falls 25 ctm.; and from 266 σ to 175 σ, if the ball falls 5 ctm. Another observer (Beaunis) found that, as the time of expectation increased from 300 σ to 500 σ or 600 σ, the time of reaction also increased from 155 σ to 205 σ; but as the time of expectation increased from 600 σ to 4000 σ, the time of reaction diminished again to 143 σ. Other more accurate and recent experiments show, however, what a variety of conditions determine our promptness and accuracy of attention.

We all know what profound physiological changes accompany the "strain" of attention, and how excessively fatiguing prolonged attention is. The character and time-rate of the breathing are altered. Sighing, yawning, and sweating profusely are frequent results of giving close attention. The vaso-motor changes are often especially marked, and sometimes the heart almost stops beating. Malebranche tells of the effect upon himself of the rapt attention he gave to Descartes' treatise *De l'Homme.* It "caused such a violent beating of the heart that from hour to hour he was compelled to lay the book aside and break off its perusal."

Nothing can well be of more importance to both student and teacher than to know something of the physiological and psychological laws of attention. Without "giving" attention, successful study is impossible. Without "securing" attention, successful teaching is equally impossible.

Variations of Attention. — It is a common experience that attention cannot long be held concentrated, or "focused," upon one object with a steady strain. Experiment confirms this experience and points out certain measurements for the rise and fall of attention as accompanying all conscious life. This *variable* character marks all kinds and degrees of attention. The rhythmic movement of attention may be illustrated in the following, among many, ways. If a ticking watch be held at such distance from the ear that its sounds can be heard only with a very strict attention, some of the successive ticks will drop out of consciousness altogether. This is not because the objective stimulus varies in intensity, but because the attention we are able to give to the sensation varies. Helmholtz showed that a black radius on a rotating white disk may be made to shorten and lengthen alternately by fixating it with a steady attempt at uniform attention. A gray disk looked at in this way, when lighted with uniform intensity, undergoes changes in its apparent brightness. Ebbinghaus, while experimenting to determine how many "non-sense syllables" could be learned and remembered in series, under different conditions of learning and remembering, discovered periodic oscillations in the mental susceptibility to attend. Thus, in 84 experiments with six sixteen-syllable series, the mean time required for learning was as follows: for the first, 191 sec.; for the second, 224 sec.; for the third, 206 sec.; for the fourth, 218 sec.; for the fifth, 210 sec.; for the sixth, 213 sec.

Distribution of Attention. — In the periodic variations of attention under conditions like those just described, what happens between two *maxima* of intensity is not a complete loss of consciousness. It is often rather a wandering of a certain amount of psychic energy to some other object in the field of consciousness. In general, *the arising of any new factor or object in consciousness takes place only in connection with a redistribution of attention.* Both the "focusing" of attention and the "distraction" of attention are instances under the general principles of the distribution of attention. Suppose, for example, that, in order to test the disturbance of attention, we experiment first, with a series of simple muscular reactions in response to a stimulus of light; second, with the same reactions while a weak reflected light flickers across the visual field; third, when the person reacting is further distracted by the image of a revolving card. The average times of reaction for the three series are, — for the first series, 140 σ; for the second, 148 σ; for the third, 139 σ. Evidently, however, in these results a number of influences besides the distracting sensation are present.

Binet attempted the same problem by noticing the effect of "doing a sum," or "reading aloud," etc., upon a person who is trying to press a tube a certain number of times, once in so often, and with a uniform pressure. These distractions produced (1) irregularity of interval in the motor discharges; (2) diminution or slower rise of the curve of pressure; (3) incoördination of movement; (4) dropping of some of the volitional acts out of consciousness.

The "mechanism" of some of the more important characteristics of attention, as varying in "focus" and "distribution" and as determining the presence in consciousness of the "associated factors," may be illustrated by the following diagram and its accompanying explanation.

Let the "stream of consciousness," in relation to time, intensity, and extent (see p. 31 f.) be represented by the three dimensions of the solid figure: viz., the time by the length, the intensity by the height, and the extent at any moment by a cross-section (as, for example, at **q**, **r**, **s**, or **t**). Fluctuations in intensity and extent will then be illustrated by variations in the height and breadth of the figure. Thus at **q** is one *maximum* of conscious intensity; at **r** a *minimum;* and then a rapid rise to another maximum at **s**. The extent of the conscious stream, or the number of ideas grasped together at any given moment, varies inversely as the intensity of attention to any one idea or set of ideas. This may be illustrated by the assumed contraction and expansion of the sides of the figure. But if the amount of psychic energy be supposed to remain constant, the areas of the cross-sections remain equal; and then the increase of attention to one group of ideas withdraws attention from the others (the *apex* of the solid rises, and the *base* contracts).

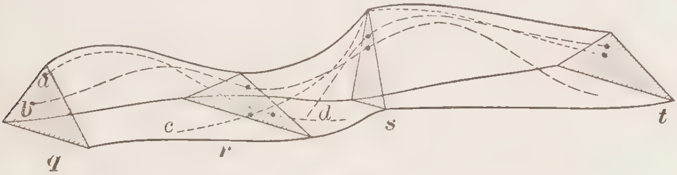

FIG. 2

The rise and fall of ideas in the stream of consciousness under the influence of the redistribution of attention may now be illustrated by the changes in position of the ideas **a**, **b**, **c**, **d**. At one moment (**q**) the idea **a** is raised to the apex by attention, while **b** sinks under relative neglect. But at the next moment (**r**), by having "attracted" attention, **b** has become prominent. And now, just before this same moment (**r**), on account of some internal or external association, **c** enters consciousness, and at another moment (**s**) has become the ruling idea, bringing with it another new idea, **d**, and fusing with **d** and with **b**, so as to absorb almost the entire amount of conscious interest and attention. Now **b** soon drops out, and **c** and **d** enter into new associations.

Relation of Attention to Feeling. — The focusing of attention and its constant redistribution changes the character of conscious states in every fundamental aspect of such states. But the general fact is especially obvious as connected with changes in the emotional aspect, with what we call "our feelings." The power which different objects of sense or different ideas possess to get for themselves attention in that "struggle for existence" which takes place in the stream of consciousness is popularly summed up in one word. That word is "interest." But to be *interested* in any object or idea is mainly to have toward it a certain attitude of feeling. What is interesting excites our feelings; what excites our feelings is attended to as interesting. So true is this that one psychologist (Stumpf) exaggerates the connection between the two and declares: "Attention is identical with interest, and interest is a feeling."

The forms of feeling connoted by the one term "interest," and in this way marked by their close relation to the distribution of attention, are exceedingly diverse. The "horrible," "disgusting," or "repulsive," has for many minds even more fascination than the "pleasant," "agreeable," or "attractive." Thus the same object, which is most repulsive on account of the character of feeling which it arouses, may be very attractive on account of its power to awaken interest and so to fixate attention. A group of children transfixed with interest in some terrifying spectacle, the novel-reader unable to tear herself away from the harrowing tale, the historical narrative which is read without weariness or note of passing time, because of the horrors with which it deals, are illustrations in place here. Extremes of similar character are familiar to students of the psychology of certain types of insanity or hypnosis. The inability to detach the attention from various objects of supreme interest may, in such cases, be truthfully described either as an affliction of "morbid emotions" or as a "disease of will." From whatever point of view looked at, these and similar psychoses illustrate the relation of attention to all those forms of feeling which are described by the general term *interest.*

More particularly, the distribution of attention among the objects and ideas in any field of consciousness is dependent upon variations in feeling as respects, (1) novelty, (2) intensity, (3) tone of pleasure or pain, and (4) freshness or exhaustion. All feelings are in themselves interesting; and the most loathsome and unbearable of all emotional conditions is that dull monotone into which no changes of feeling break. Other things being equal, the novel sensation, or idea, or proposal, is easiest attended to, because most interesting. Indeed, the interest of *novelty* is often supreme in the control of the distribution of attention. *Intensity* of feeling, within certain limits, compels attention. But when the disturbance of emotional consciousness reaches a certain height,—as when storms of anger, grief, or terror possess the mind,—attention may become lowered to the blindly-groping animal type. The *tone* of pleasure or pain influences the attention in its distribution, within the field of consciousness. Objects or ideas that excite either pleasurable or painful feeling attract our attention away from those that have a more neutral tone. On the other hand, for the self-controlled adult the voluntary yielding or withdrawing of attention increases or diminishes the amount of pleasurable or painful feeling. We tell even small children, not to "*mind*" their bruises and they will not *feel* them. The philosopher Kant trained himself not to pay attention to the pain in his chest, although whenever he allowed himself to think of it, he found it always there. Hypnotic subjects feel only the pains which it is suggested they shall feel. Here the distribution of attention under the control of the experimenter either submerges or emphasizes the tone of feeling belonging to the different perceptions and ideas. "*Freshness*" and "*exhaustion*" are popular terms which describe how the repeated focusing of attention may stand related to emotional excitements. These characteristics of our feeling are intimately connected with the changes in interest and attention which novelty and intensity control.

Relation of Attention to Willing. — The inattentive mind is habitually the unwilling mind,—toward the same objects, ideas, or plans. And, indeed, attention seems to imply, even in its lowest form, a certain amount and kind of willing. From the most fundamental point of view, all psychic energy is self-activity; it appears in consciousness as the energizing, the conation, the striving, of the same being which comes to look upon itself as "attracted" to discriminate this object from that, or as "solicited" to consider some pleasant thought, or as "compelled" to feel some bodily pain. Even when attention is most plainly forced, we cannot wholly neglect this aspect of it as active consciousness. It is still *my* attention; *I* yield to the impulse; *I* submit to the force. When the physiologist Foster speaks of an amœba as having "a will of its own," he probably does not mean to indicate anything psychological by his words. But the researches of Binet and others into the "psychic life of micro-organisms" suggest that something similar to primary attention, as a selective function of will, may take place even with them. At any rate, in man's case, the truth is clear: *Attention which, in its higher stages of growth, may reach the conditions necessary to intelligent, purposeful choice, is present as a blind striving and selective, but self-originating, activity in all the lower forms of man's conscious life.*

Relation of Attention to Sensations and Thoughts. — The effect of attention upon the discriminating and reflecting powers of the mind is most immediate. In all our daily waking life there are scores of obscure sensations just lurking at the threshold of consciousness, which may be definitely localized and made relatively vivid and impressive, if we will only attend to them. Stop now and attend to the "feelings" in the different members of your body. Such a voluntary survey of the external areas of the body brings out in bold relief a tangle of temperature, pressure, and muscular sensations; and this effect takes place in any of the bodily superficies chosen for the survey. Indeed, he who has not tried this experiment with persistent attention, does not *know* how inchoate and confused some of these sensational experiences customarily are.

Attention not only intensifies sensations; it actually creates them. Experiment has shown that most persons who are attentively expecting, for example, a wire to be heated, or a glass bead to appear at a certain distance, feel and see what they attentively expect, even when the objective stimulus is wanting.

Repeated acts of attention directed upon the same sensory objects heighten the effects of discrimination in enlarging and "clarifying" the contents of the field of consciousness. If a disk with differently colored spots or different letters on its surface be displayed for a brief time, the most fixed attention will at first enable only from three to six of these objects to be discerned. By repeatedly attending to this field, a larger number of objects will be *seen* (not simply remembered) after the display of the disk for the same length of time.

We thus reach a partial explanation of what is called "attention as adjustment," or "expectant attention." In truth, every more clearly discriminating act of attending implies some attentive discrimination already exercised upon the same object. To state the fact as a paradox: No special attention without previous attention. Thus we see best what the bodily and mental mechanism is already best *adjusted* to see, what we *expect* to see. And the case is the same with hearing and with our other senses. Moreover, the training of every mind determines largely the particular features of any object to which attention shall be given; as well as the speed and accuracy of the resulting discriminations. The Greek scholar who is accustomed to dwell upon the minutiæ of words detects the missing or wrong accent. The man interested in wood-craft notes the flight and the peculiar feathering of the birds, the mottling of the bark, the chirping of the insects — things unseen and unheard by other eyes and ears. As Professor Münsterberg has pointed out: The clear mental representation in consciousness of **a** is preceded by another condition of consciousness which, according to its content, contains the less clear mental representation of **a**. It is as though in every field of consciousness a great variety of sensations and ideas were possible claimants for the available psychic energy; a sort of preliminary survey enables us to select such of them as best suit our tastes, or our present purpose, and upon *these* we bestow the preference in the further distribution of that energy.

In brief: *I attend in some degree to every content of consciousness, and I have the better grasp of consciousness upon every content to which I give much attention. Only if this be so, can I learn to select within limits that to which I will particularly attend, and really grasp mentally that to which I choose to attend.* Sully is in the right when he responds to Stumpf's claim that it is improper to speak of one "attending" to a box on the ear: "One would like to know the fortunate man who could receive a box on the ear, and *not* attend to it." What, indeed, should we say to such a man the better to express his mental peculiarity than this: "You do not seem to *mind* such trifles much."

Attention as Fundamental in Intellectual Life. — We are now prepared for a clearer notion of the beginnings of a truly *intellectual* development. For centuries it has been held that "analysis" and "synthesis" are necessary to the evolution of human intelligence. We now see that all attention, considered as variously distributed degrees of discriminating consciousness, implies this fundamental process of analysis. *Attention is a process of selective focusing of psychic energy.* This is the primary condition of *all* intelligence. "Human" intelligence is characterized by the relatively unlimited character of the development of this process, as well as by the great variety and range of objects upon which it can be directed, on account of the infinitely richer experience of man as compared with the lower animals.

Kinds of Attention. — Two kinds of attention may be recognized: (1) forced attention and (2) voluntary attention. In the earlier movements of discriminating consciousness its direction and distribution are not *voluntary*, in the fuller meaning of this word. The rather does the discrimination seem "solicited," "impelled," or "forced." In the later and more highly finished processes of the mental life, there is much attention which continues to bear the same character: *it* — the object — controls our discriminating and selective consciousness rather than *we* control ourselves. The further discussion of this difference requires that it should be preceded by some examination of the conative aspect of mental life.

The neglect to recognize the universal and elementary character of attention, and imperfections in the dependent doctrine of discriminating consciousness (or “primary intellection”) have led many psychologists into serious errors. The psychologists of the English empiricist School, such as Locke, Hume, Hartley, the Mills, and even Herbert Spencer, have, in general, almost entirely neglected these patent phenomena of all conscious life: they have, therefore, almost wholly misconceived the nature and the explanation of human, and even of animal intelligence. Their successors in this country to-day are suffering much from the same narrowness. According to Professor James, the failure to notice “so patent a fact as the perpetual presence of selective attention” is due to the unwillingness to attempt a problem whose solution would so obviously interfere with “the smoothness of their tale.” However this may be, any psychological theory, and even any descriptive history of mental development, which lays all the emphasis on sensations and ideas as content of a passive consciousness, and which overlooks the all-pervasive and dominant fact of an active and discriminating and selective psychic energy, is doomed to failure. (Comp. p. 22 f.) The impressive thing about the mental life of man, the thing that carries with it the seductions of mystery and sounds the inspiring call to renewed effort at *research*, is just this marvellous psychic energy. “Receiving impressions” to all eternity would never result in developing what we call “Mind.” The active response, the forthputting of the mind's own powers according to its own constitution, is the prominent and the really impressive thing for the psychologist.

Of the English psychologists, Ward and Sully have been among the first clearly to recognize the true psychological import of attention. They have been followed by Mr. Stout, who devotes most of his two volumes on “Analytic Psychology” to the speculative treatment of this problem. Ward holds that “the relation of presentation itself implies what, for want of a better word, may be called *attention*, extending the denotation of this term so as to include what we ordinarily call inattention. Attention, so used, will thus cover part of what is meant by consciousness — so much of it, that is, as answers to being mentally active, active enough, at least, to receive impressions." The truth that *inattention is still attention* is expressed in popular language when we say: "Are you attending strictly to *me*, or to *it* — to *this* thing, to the exclusion of *that?*"

Nature of Primary Intellection. — We have frequently used, in a variety of connections, the term "discriminating consciousness." Regarded as an activity, such conscious procedure accomplishes the elaboration of all materials, the organization of all mental processes and forces, the development of the whole life of the mind. Even to speak of a "state of consciousness" or "circuit of consciousness" is absurd, if the influence of such discriminating activity is excluded.

But we have just seen that the doctrine of the focusing and distributing of attention is inseparably connected with the same fundamental experiences. The wandering of attention, the concentration of attention, the selective influence of attention, furnish topics which cannot be investigated without constant consideration of this same activity in discrimination. Indeed, the very nature of all consciousness enforces the same set of truths; for *consciousness regarded as objectively discriminated and as having a certain concrete content, and consciousness regarded as discriminating activity, are only two sides, as it were, of one and the same consciousness.* In other words, to be "really in" a certain conscious state of impression — by some object or idea — and to be "doing something" by way of discerning the nature of the impression — of the object or the idea — are complementary of each other.

All this may be described as being alive and developing, as an *intelligent* being is alive and develops. Such is the nature of what we shall call "primary intellection." But the term requires some further explanation.

Physiological Conditions of Primary Intellection. — The lowest order of dawning intelligence implies the bringing of two or more sensations, feelings, or ideas, into the unity of consciousness and the dealing with them there, as it were, according to relations of similarity or difference consciously discerned. Although we are ignorant of those precise conditions of the brain-centres which are involved in this complex mental activity, we are justified in holding some such general view as follows: To the complexity and elaborateness of the processes involved on the psychical side some correspondingly complex and elaborate brain-processes stand related.

The human brain is a kind of physical unity, and yet it has a great variety of different "centres" so-called, which bear special relations to the different primary processes of consciousness. These centres are united by "association-tracts"; and the impeding or destroying of these tracts has an important influence over the collective or allied functions of the centres themselves. Thus the animal which has suffered injury of its visual centres, or of the nerve-tracts associating them, may still be capable of visual sensations; but the *intellectual* quality of the sensations, as dependent upon active discrimination and psychical association, is relatively lost. Hence the soul-blindness to which reference has already (p. 37 f.) been made. In certain forms of aphasia, too, the human patient may be able to hear all manner of sounds, but the sounds lack their former sense (or intellectual quality) and can no longer be heard as *words*, in the fuller meaning of the term.

The complexity of the physiological processes which accompany even the more primary intellectual activities, and the necessity that these processes should spread over the appropriate centres, by way of the "association-tracts," is illustrated in another manner. We have already seen that attention, with discrimination, requires prolonged reaction-time. For example, while the time for simple reaction may be only from 100 σ to 200 σ, counting single letters requires 317 σ–530 σ; but counting letters by threes can be done in 209 σ–440 σ, while adding pairs of numbers requires 751 σ–1533 σ. This *time*, on the physiological side, is undoubtedly occupied with the spreading and maturing of the processes, necessary to discrimination, in the brain.

It is scarcely desirable in this place to do more than remark upon the truth which all psychology emphasizes; namely, that, while the psychical activities are dependent upon the completion of certain physiological processes, they cannot themselves be regarded as other than genuine *psychical activities*.

Consciousness of Resemblance. — A further analysis of that complex activity called attentive and discriminating consciousness shows that it has several "moments," or possible aspects. Of these, one of the most significant and fundamental may be described as "consciousness of resemblance." An examination of experience, from the psychologist's point of view, shows that *the immediate awareness of resemblance is a primary and a constant form of intellection, which is necessary for the beginnings and for all the development of a truly mental life.*

Resembling Consciousnesses not Consciousness of Resemblance. — That form of psychological theory which studies consciousness only "content-wise," and assumes that somehow sensations and ideas organize themselves, makes an important mistake at this point. It confuses two resembling conscious states with the state of being conscious of a resemblance. But the consciousness of resemblance is always an intellectual activity. It is something new as compared with the *mere* existence of resembling sensations or ideas or other conscious states. This is true of the simplest mental experiences. The sensation of blue *is* different from the sensation of red, but the sensation called up by this red-covered book resembles that called up by yonder sunset cloud. And each tick of the clock to which I am listening resembles the other ticks of the same clock. The immediately successive ticks may differ, as they seem to me to sound (perhaps depending partly, as we have already seen, on the rhythm of attention — tick-*tack*, tick-*tack*, etc., rather than the monotonous, tick, tick, tick). But in all these experiences, and in all other similar experiences, when we have noted that the sensations *are* different, we have not explained how they come to *seem* different. In psychology, the "seeming" of sensations is their real "being." A "noticing" or "becoming aware of" the likeness is necessary to the existence in consciousness of the likeness. And this *noticing*, as a consciousness, is not accounted for by the fact or the theory of an objective or non-conscious likeness.

In general, *consciousnesses that resemble each other cannot — simply by being brought into juxtaposition or being compounded — account for the consciousness of resemblance.*

Consciousness of Difference. — Psychologists have debated much over the priority of these two allied forms of primary intellection, — the consciousness of resemblance and the consciousness of difference. A great amount of ingenuity has been exercised in trying to describe the character of the earliest known object (*primum cognitum*). From our adult point of view we cannot even imagine any knowledge without both kinds of discrimination taking place. Both the immediate awareness of resemblance, and the almost or quite equally immediate awareness of difference, seem necessary in order to start all our intellectual development. And, as we shall see later, the primary forms of analysis and synthesis are involved from the first. At the same time, as regards theoretical priority, the consciousness of resemblance and the consciousness of difference do not appear to stand in precisely the same relations to the very beginnings of intellectual life. The grasp of active, discriminating consciousness upon the similar, and the accompanying pleasurable feeling of recognition, may perhaps be regarded as the more fundamental in the evolution of intellect.

Precision and maturity of intellect, however, depend upon constant and prolonged attention to differences in external objects and in ideas. Mistakes in hasty assimilation of objects that are really unlike, and the painful experiences which follow such mistakes, compel us to attend more carefully and to discriminate, in the interests of our practical ends, the important differences of things. Science is interested in discovering the obscurer and minuter, but often more enduring, differences.

Growth of Primary Intellection. — The intellectual processes of the infant are undoubtedly very vague, uncertain, and fitful. In its night, or rather its early dawn, all cats are alike, for all are gray. The more interesting similarities of the objects of its attention — attention which is chiefly allured or forced by the working of the psychophysical mechanism — are noted "in the lump," as it were, and more than half in a blind, instinctive way. A vague consciousness of *similarity*, without an awareness as to *similar-in-what-respect*, may well describe this earlier form of discrimination. Such a conscious state may also be spoken of as a "feeling of likeness," rather than a clear discrimination of likenesses. Even in our adult life we have frequent experiences which help us to picture the beginnings of intellectual life. We wake up a little way from dozing, or from a day-dream, and describe our conscious state by asking: "Did I not hear something *like* — a sigh, the rustle of a dress, the dropping of the eaves?" or, "Did I not see something *like* — a bird, a man, pass before the window?"

In awakening and guiding the most elementary forms of the consciousness of resemblance nothing is more effective than a rhythmic repetition of pleasant sensations. Here everything is favorable to stirring the consciousness of the infant to an act of simple discernment and to a recognition of resemblance. The nurse croons over it, rocking it in her arms; the bright toy or the lighted candle moves to and fro before its eyes; or it is patted or stroked to soothe it. Again and yet again the *same* sweet experience is noted in the stream of conscious states. How can the sensitive soul of the child fail to be allured into an improvement of the opportunity to grasp the simple but important fact, that A, A_1, A_2, A_3, etc., although succeeding in time, are similar states of consciousness as respects the content of sensation, the tone of feeling evoked, and the motor activities engaged?

On the contrary, it is customarily some abrupt change in the content of the stream of consciousness, and some accompanying shock of painful feeling, which stimulates the consciousness of difference. The cup of milk which is not warmed or sweetened to the customary standard forces the mind to discern *wherein* it does *not* suit, as its predecessors have, the infant's taste. The shock of disappointment, the inhibition of the smooth recurring of the psychic mechanism, the reversal of what appears entitled to be felt as customary and according to law, are educators in the distinguishing of differences. Life and comfort depend upon making distinctions; this is true of every species of animals. The sharpening of intellect comes, in man's case, by way of learning that things *are not* what they at first *seem to be.* A hasty identification on the basis of obtrusive similarities costs us the loss of many a success which might otherwise have been obtained.

Varying Amounts of Intellection. — It is customary to measure intellectual processes and attainments as though they were quantities which could be brought into comparison through some standard. Thus, men speak of "great" and "small" intellects, of "strong" and "feeble" faculties of thought, of "contracted" and "capacious" minds. We admire others when we see them doing with readiness, ease, and precision things which we can do only slowly, painfully, and imperfectly, if at all. We incline to attribute to such men superior *mental* attainments, and to accuse ourselves of being deficient in *intellectual* gifts. There may be, however, a fundamental fallacy in this. For there are not a few performances which *simulate* a high degree of genuinely intellectual development but do not really involve any genuine intellectual processes at all. The purposeful action of a natural mechanism, like the spinal cord of a decapitated frog or the apparatus for scattering the seed of some plants, may seem to be a very intelligent affair. The lower animals, generally, behave in some respects as though they were the intellectual superiors of Aristotle or Kant. In some other respects they also behave as though they had a keener and more refined sense of beauty than Raphael or Tintoretto.

In this connection we must emphasize again the psychological truth: *Genuine "intellection," even of the most rudimentary sort, implies the consciousness of resemblance and the consciousness of differences, and the selective and purposeful directing of psychic energy in focusing and distributing attention.* Thus the susceptibility to minute likenesses and minute differences by way of merely "feeling," or "sensing" them, "in the lump," as it were, is a precondition of intelligence. It is a constant accompaniment of the development of intellect. But it does not of itself mark a high degree of intellect; nor is it the measure of intellectual advance. This will be better understood when we have discussed the development of the intellect, under the categories of time, number, etc. Here it is enough to note that, for example, Binet's experiments proved a child of from four to six years old able promptly to distinguish the difference between a group of 14, 15, or 16 objects and a group of 18 objects. The same child could tell 17 from 18 objects eight times out of nine trials; but it could not count beyond three, and it pronounced 10 large objects "more" than

18 small ones. Preyer has shown that one can train one's self to discriminate accurately up to 20 or even 30 objects, when they are exposed far too briefly to admit of being counted. The shrewd crow of which Romanes tells us, who seemed able to discern the difference between five men and six men, neither counted nor performed any other highly intellectual process.

Primary Intellection and the Other Faculties. — The analysis of attentive and discriminating consciousness has shown us how complex and interrelated are all, even the most elementary processes of the truly mental life. If this analysis is carried still further, it will be seen that some kind of memory and of ideating has been implied in what has already been said. For no field of consciousness, or conscious state, is wholly stationary; and sensations, or objects, or thoughts, do not exist or abide in the stream of consciousness, as the elements of some material composite thing remain a part of that thing. Therefore, for the discernment of likeness or unlikeness — and this has been found to be fundamental in intellectual development — some form of *re*presentation is necessary. It will appear that the ability to compare depends upon the ability to recall, to do what has been aptly called "hark back" in the stream of consciousness, and so get a clearer "idea" of what the particular object was. Experiment shows that if we are allowed time to do this, and so "to get an *idea*" of what we just saw or heard or tasted, — our discernment of likenesses and unlikenesses is improved. In picking out blocks, for example, which are of the same weight, or which differ from each other by a fixed amount of difference, we instinctively lift both the weights to be compared and the standard weight again and again. We are thus clearing up and deepening our "ideas" of the things to be compared. But this is an *intellectual* process.

Indeed, *our very power to constitute the different mental factors into the unity of one state, into a system of related* *objects, whether similar or different in quantity, quality, and local coloring, is dependent upon the influence of ideas.* But in saying this we have brought this subject as far along in discussion as is profitable until we have had time to discuss other subjects.

Attention may profitably be called again to the mischievous result of an attempt to reduce the entire science of mental life to an account of the receiving and association of sensations, and of those revived images of sensations called "ideas." The confessed meagreness of this theory Mr. Spencer has tried to supplement by speaking of a peculiar sort of "feeling" interpolated between the two suggested sensations or ideas. Thus the whole mental life of man is to be accounted for as a succession of "agglutinated" and "agglomerated" sensations and ideas, with "feelings of relation" thrown in between them.

The influence of feeling as stimulus and guide in the formative period of the intellectual life cannot be denied. Its important influence is, indeed, evident all the way through, and in every process from lowest to highest. But just as little, and even less, can the fact of an active discriminating mind be denied, — of a consciousness of resemblances and differences, a selective and preferential exercise of psychic energy, in the interest of growing powers of cognition and of motion. "*Mind*" — in that sense of the word in which we are conscious of being minds — cannot be built out of sensations and ideas that either get "fused" and "agglutinated" and "associated," or fuse, agglutinate, and associate themselves.

The considerations of this chapter may serve to warn the psychologist against two extreme views. One of these is the view which disregards the presence of active intellect from the very beginnings of all truly mental life, and which explains the development of this life as a mere growth in complexity of the contents of consciousness, considered as impressions or passive states. The other is the view which regards the mind as some sort of an unknown or concealed entity, which has characteristics that are never displayed in the conscious processes, — a being which may properly be regarded as existing over or beneath or outside of its own conscious processes.

Both these views are unpsychological. The former, because it contradicts many plain psychic facts; the latter, because it departs in its speculations from the basis of indisputable psychic facts.

[On Attention compare Sully: The Human Mind, I, chap. vi; James: The Principles of Psychology, I, chap. xi; and Külpe: Outlines of Psychology, Part III, §§ 72–76. Among monographs on the subject may be mentioned, Ribot: La Psychologie de l'Attention; G. E. Müller, Zur Theorie d. sinnlichen Aufmerksamkeit; and Dohrn: Das Problem d. Aufmerksamkeit. What has been called in this chapter "Primary Intellection" is a subject far too little treated of in most works on Psychology. Compare, however, James: The Principles of Psychology, I, chap. xii and xiii. Wundt: Logik, I, pt. i, chap. ii; Binet: La Psychologie du Raisonnement; and Preyer: The Development of the Intellect, are also to be recommended for more extended study of the subject.]

CHAPTER IV

SENSATION

Important psychological errors need to be further guarded against at this point. In psychology, as has already been explained, such terms as "elements" and "factors" of consciousness, or the "fusion" and "analysis" of factors in the elaboration and development of mental life, are figurative. They are designed to emphasize the complex content of the conscious states and the nature of that increase in richness and effectiveness which is shown by succeeding portions of the "stream of consciousness." This explanation should be borne in mind when these terms are applied to sensations and to the development of the life of sensation.

Nature of Sensation. — It has also been shown that every conscious state has its *active* aspect. (See again p. 22 f.) To be conscious implies the doing of something by the mind; it is to be attentive and discriminating, and these are forms of directing and selective energizing. But sensations appear as peculiarly *passive* modifications of consciousness. Hence they are spoken of as "impressions"; the word correctly represents one important side of sensory experience and of a valid theory of sensation. For that very reason it is well to remember that even this most passive experience is characterized by attention and discrimination. Therefore sensations may always be spoken of as conscious *processes* or forms of the forthputting of mind, and not merely as passive elements or inert factors of mental life.

Combining the two previous considerations, we arrive at a more complete conception of the nature of sensation. First, every sensation is always a *psychic affair*. Sensations, of every description and degree of intensity, are, for the psychologist, modifications of the stream of consciousness. They neither are, nor are like, any external stimulus or resulting nerve-commotion. They cannot be spoken of as propagated from the skin or the eye to the brain, or as compounded and "elaborated" in the brain. Second, sensations, although they are psychic events, under all normal conditions require the antecedents of a nervous excitement that is *due to external stimuli*. They imply, in respect of their physical antecedents, some action of things upon the peripheral parts of the nervous system (the so-called "end-organs of sense"). Third, although sensations can never be identified by the psychologist with the properties and doings of things, they are those modifications of consciousness, those forms of the reaction of mind to external stimuli, by means of which we gain the cognition of things. To a mind without sensory experience, even if such a mind could be conceived of, there would come no dawning and no developing consciousness of an external world. At the same time, fourth, *mere* sense, if we are to speak in that way, would give no knowledge of things. This will become more apparent as the development of perception is studied. But it follows from the truth that attention and discrimination belong to the very beginnings of our sensory experience; its forms of mental functioning are something more and other than the mere having of sensations.

In a preliminary way, then, we may define *sensation as that peculiar modification of consciousness (or conscious process) which customarily occurs when some organ of sense is excited by external stimuli*. If, however, we look forward and descry the relation which this elementary conscious process sustains to the knowledge of things, we may say:

Sensations are those peculiar modifications of our consciousness by which the nature of sensible objects is made known to us.

Nothing can well be more absurd, from the point of view to which the psychologist must remain faithful, than to follow those who, like Claude Bernard and Lewes, speak of the contraction of living tissue as a "sentient" process; or who, like Comte and Dr. Maudsley identify physiology and psychology, and subordinate the latter to the former. The same criticism applies with almost equal force to those who follow Mr. Spencer in describing the origin, fusion, and development of our sensations, as the aggregation and agglomeration of simple "nervous shocks." But, on the other hand, it can be satisfactorily shown that almost the entire science of so-called "physiology," in its treatment of the organism of sense-perception, is really "psychology" and, sometimes, meagre and poor psychology. It should never, for a moment, be forgotten that sensations are phenomena of *consciousness;* and that they are, as Horwicz says, "no mere passivity, but a reacting impulse." Even to speak of them as "an arousement of the Psyche" is much nearer the undoubted truth than to speak of them in terms of nervous shocks. The recognized physiological use of the word "sensitiveness" to mean the ability of organic tissue to respond to irritation is not in question here.

Physiological Conditions of Sensation. — At the same time, it is through the study of the origin and development of our sensory experience that psychology receives most assistance from physics and physiology. So true is this that, in treating of the entire doctrine of sensation, we shall constantly appeal to the explanations which these allied sciences offer, especially to experimental psychology.

In general, the physiological conditions of sensation are the following: (1) An *end-organ* which has (*a*) such a physical constitution as enables it to modify and transmit some particular kind of physical energy (light, sound, heat, mechanical pressure, chemical changes), and (*b*) a histological structure capable of changing the modified physical energy into a physiological process or nerve-commotion. (2) The nerve-commotion set up in the truly nervous elements of the end-organs of sense must be conveyed to the central organs along more or less clearly marked lines of conduction, called *nerve-tracts*. (3) Important modifications of these propagated nerve-commotions (such as may be somewhat vaguely described under such terms as "elaboration," "inhibition," "fusion," "adjustment," "association," etc.) take place when the nerve-commotions reach the peculiar histological structures of the *central organs* (especially the brain) and call out their physiological[1] functions.

In all ordinary cases, it is only when the foregoing physiological conditions have been fulfilled that sensations arise in consciousness. And the quality, quantity, complex character, tone of feeling, time-rate, and changes of the sensations in the stream of consciousness depend upon the way that these physiological conditions are fulfilled.

It should be understood, at least in a preliminary way, that different sensations stand in different relations to the physical organism and to the development of sensation-experience. The tactual and, perhaps, the muscular sensations are fundamental and universal. Biology makes important use of this fact in its account of the evolution of animal species. Some kind of sensitive integument which is responsive to these forms of stimulation belongs to the lower forms of animal life. The human embryo probably begins its sense-experience with tactual and muscular sensations only. In all highly organized animals the outer integument, and the organs of sense it contains, develop from the same embryonic layer ("Epiblast") from which come the central organs of the nervous system.

Kinds of Sensation. — The popular classification into the five senses of smell, taste, hearing, sight, and touch is based upon the more obvious parts of the body, through the excitement of which these kinds of sensation come.

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[1] For further details under this and the following sections, the pupil should consult the author's Elements of Physiological Psychology or his Outlines of Physiological Psychology; or some similar treatise.

It is by no means complete. In any attempt at classification several truths of common experience, as well as certain more scientific considerations, need to be kept in mind. First: all the sensory experiences of our daily life are complex; they result from the combined activity of several organs and may be described as fusions of different simple sensations or kinds of sensations. Second, our experience is not of sensations, "as such"; it is rather a knowledge of things through the senses. Third, the variety of the less complex sensory processes into which the analysis of the psychologist breaks up this sensory experience is bewilderingly great. And, fourth: there is, at the last, no satisfactory way of classifying sensations but to appeal to experience in connection with the use of the different organs of sense. The results of science, then, are an extension of the popular classification rather than an entirely new classification.

In no case can we reason deductively from a knowledge of the physical conditions of sensation to the different kinds of resulting sensations. Why the modifications of consciousness called "noises" or "tones" run through a certain series, N, N_a, N_b, etc., or T, T_a, T_b, etc., while the physical stimulus of sound is changing from S to S_1, S_2, etc., we cannot in the least explain. Even less, if this were possible, do we know why another kind of stimulus—that of light upon the eye—should go through the series, L, L_1, $L_{,2}$ etc., in order to produce the sensations of red of different shades (R, R_a, R_b, etc.) or of green of different shades (G, G_a, G_b, etc.).

Sensations of Smell.—These are the peculiar modifications of consciousness which are the characteristic result of exciting the end-organs of the nose. The end-organs of smell are minute nervous structures scattered over the mucous membrane in the upper region of the nasal cavity. The stimulus is "effluvia," or exceedingly minute particles thrown off from the smellable substance and drawn over the organs in the inspired current of air. This view is suggested by investigations which have gone on since Romieu (1756) discovered that small bits of camphor on the surface of water have a curious rotary motion. Subsequently, several hundred odorous substances have been observed to behave in the same way.

Smells, as sensations, are generally said to be "unclassifiable." Each smellable object has its own peculiar smell; the behavior of dogs and of certain hypnotic subjects leads us to believe that each human body has a characteristic odor due to its peculiar effluvia. Smells cannot be sorted out into classes, as can colors into red, green, blue, and the like. For the same reason, no graphic representation, by use of a line, circle, or triangle, is available for the phenomena of olfactory sensations. The most recent investigations, indeed, point in the direction of our being at some time able to arrange these sensations in a scheme corresponding to the chemical constitutions of the substances exciting them. For example, products relatively poor in hydrogen may form "an aromatic series," etc.

Sensations of Taste. — Somewhat more scientific information is obtainable respecting these sensations than those of smell. The end-organs of taste are certain "gustatory flasks" or "bulbs" contained in the *papillæ* of the tongue and, perhaps, the anterior portions of the soft palate. The question whether tastable substances excite different sensations when applied to different portions of the tongue cannot be easily answered. Many persons seem to taste sweet and sour chiefly with the tip of the tongue, alkaline and bitter with its roots. In general, only fluid bodies, or such as are to some extent soluble, excite sensations of taste. The saliva is the natural solvent for all tastable substances that are solid.

The attempt has been made to classify sensations of taste. Thus Wundt would add the alkaline and the metallic to the four recognized classes of the sweet, the bitter, the salt, and the sour. Much of what is commonly called the "taste" of things is traceable to the olfactory sensations connected with having them in the mouth. Even this admission, however, does not make satisfactory such a meagre list as comprises only six different tastes. Attempts have been made here also to establish a scientific classification on a basis of chemistry. For example, the soluble chlorides are said to have a salt taste; but the carbons have generally an acid taste; and sweet-tasting substances are alcoholic bodies containing the radical CH_2OH. This is chemistry, however, rather than psychology.

Sensations of Sound. — Modifications of consciousness which arise when the nerves of the ear are irritated by acoustic waves (sensations of sound) are of two kinds: Noises and Tones, or musical sounds. The mechanical structure of the organ of hearing is very complicated, and is so arranged as to reduce waves that, in the air, have a large amplitude and low intensity to waves in the fluids of the inner ear which are exceedingly minute but of increased intensity. It is in the inner ear that the peculiar end-organs are set, upon which the acoustic stimulus acts in a mechanical way.

In all ordinary experiences noises and tones may be fused together. There are few perfectly "pure" tones derived from any musical instrument, and the trained musical ear can detect some sort of a tone in the worst noises. If the violin is liable to sound "scrapy," the axe "rings" in semi-musical way, and the door slams with a certain timbre of sound. When short, sharp noises, like a watchman's rattle, are made as many as six hundred in a second, the result may or may not be a tone, according as the accompanying sounds are, or are not, dampened.

Musical sounds, or tones, are ordinarily complex and result from the fusion of a number of simple sensations in a sensation-complex which the German psychologists call a "clang." Clangs vary in respect of pitch, intensity, and timbre. They are "high" or "low," "loud" or "soft," and they differ as regards that kind of shading which distinguishes, for example, the tone **a**, when sounded on the piano, from the same tone on the violin. The *pitch* of tones depends upon the rapidity of the periodic vibrations which occasion them. Regarded as varying in pitch, they may be arranged in a "scale," and the entire scale may then be symbolized by a line which ascends from a certain indefinite depth to a certain indefinite height, and which has its tones located at distinguishable points between. The way to make a scale of tone-sensations is, given two tones, as m and n, that are separated by a discernible interval, to put a new tone midway between them, say m'. Then between m and m' another tone may be located; and so on until the limit of discernibility is reached. Experiment shows that the ear can discriminate far more nicely than the voice can execute. He would have a poor ear who could not discriminate more nicely than quarter tones; while the most accurate singers would find the greatest difficulty in singing in quarter tones. By the *timbre* of clangs we understand that complex quality which results from mixture of the overtones and the fundamental tone. The facts as to the intensity of acoustic sensations will be discussed in connection with the general theory of sensation magnitudes.

Visual Sensations. — Those modifications of consciousness which arise in response to stimulus of the eyes are of two kinds, Light and Color. The external organ of sight may be briefly described as a water *camera obscura*, with a self-adjusting lens, and a concave, sensitive membrane as a screen on which the image is formed. Light (in the physical meaning of the word) is not, however, the immediate stimulus of the end-organs of this sense. The truly nervous process begins when the rods and cones of the retina are excited by photo-chemical changes in the back layers of the retina. Sensations of *light* vary, theoretically, all the way from pure white to pure black, through all discernible shades of gray. These sensations, like all sensations, vary in intensity — from the lowest to the highest degree of brightness. But sensations of *color* vary in that peculiarity of quality which an inspection of the lines of a spectrum enables us to distinguish. Things are known to have a great variety of the more important colors and of minor variations of colors. Using a more precise terminology, we may speak of many "hues," or colors, as determined by wave-lengths of the stimulus, which may be darkened to make various "shades" and whitened to make various "tints."

By experiment, either in the rough way of the unscientific painter or in the carefully guarded way of the experimental psychologist, we find that mixed impressions of color *do not* differ as do the colors used for the mixture. Thus by selecting "hues" that lie at favorable intervals along the spectrum, and mixing them, an indefinite number of variable colors may be attained. Indeed, all the colors are obtainable by mixture of a very few fundamental colors. How many, and what are the precise hues by mixture of which in differing quantities and degrees of brightness we can obtain all possible colors is, of course, a matter for experiment to determine. Experiment seems to show that a selection of *three* such elementary colors — namely, a *green*, a line somewhere among the so-called *reds*, and a line somewhere in the so-called violets or *blues* — will enable us, for most persons' eyes, to produce by mixture nearly all the different color-sensations. Thus the colors of nature may be considered as compounds of three *fundamental* sensations — red, green, and blue. But these sensations are not precisely like those included in the spectrum. To quote from Dr. Scripture: "The fundamental red would be a deep carmine, the red of the spectrum being somewhat whitish and yellowish. The fundamental green is far greener than spectral green, and the fundamental blue corresponds nearly to indigo blue."

Purity of Color. — Sensations of color are said to be "pure," or "saturated," when they are free from admixture with other color-sensations. But none of the hues of our ordinary experience are perfectly pure; for they may be made to appear brighter by looking at them when the eye has already been "fatigued" with the complementary color. This composite character of our color-sensations does not, however, admit of analysis by attentive and discriminating consciousness in precisely the same way as does the composite sound, the so-called "clang." Normal eyes would distinguish between a decidedly *blue*-green and a *yellow*-green; and, if one had never seen orange, but was familiar with yellow and red, one might possibly regard the former as a mixture of the latter two. Probably the analysis of "seal-brown" into black, white, and orange would be difficult for every one; and certainly the analysis of white into purple and green, or into orange and blue, or into violet and yellow-green, is quite beyond the limits of the most attentive discrimination.

Complementary Colors. — The colors mentioned in the three pairs of the last sentence, when mixed in certain proportions by rotating disks, upon most eyes do result in the vision of an impure white. In general, white of great purity can be produced by mixing an indefinite number of pairs of colors which lie at some distance from each other in the color spectrum. "Hues" which, when mixed together, produce white, are said to be "complementary" of each other. The accompanying scheme symbolizes this fact of experience. (See Fig. 3, p. 68.)

Young propounded, and Helmholtz and others (especially, perhaps, Koenig) have elaborated, a physiological hypothesis which aims to account for the main facts in our experience with colors. It refers these sensations to the simultaneous excitement of three kinds of nervous elements in the retina, in varying proportions. A plausible parallel may be drawn (so Scripture) between the use of colored screens in triple photography and the effect produced by projecting three slides simultaneously, on the one hand, and, on the other hand, the resolution of colors into three retinal processes and the combination of the three in the brain to form all colors. So long, however, as our theory states itself in the terminology of nervous facts and processes, it remains as yet only conjectural. *That color-sensations, regarded as psychic phenomena, can all be produced by fusion of not more than three "fundamental" sensory processes, may be regarded as an established truth.* By varying the degrees of brightness of light, all the modifications of consciousness due to excitement of the retina are obtained.

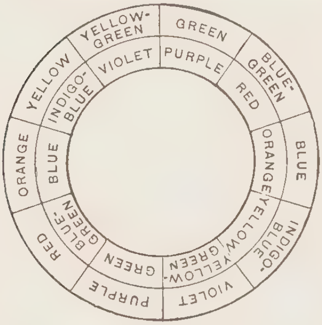
YELLOW-GREEN
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Fig. 3

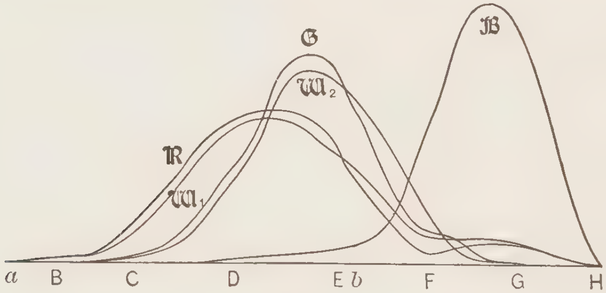

Fig. 4

Thus, in Fig. 4, if we set off the spectrum colors along the line from *a* to H, the proportions of the fundamental color-sensations belonging to each spectrum color will be shown for eyes with the usual color vision by the curves $\mathfrak{R}$, $\mathfrak{G}$, and $\mathfrak{B}$; for the green-blind, by the curves $\mathfrak{W}_1$ and $\mathfrak{B}$; and for the "red-blind," by the curves $\mathfrak{W}_2$ and $\mathfrak{B}$.

In Fig. 5, "the values of the three fundamental colors are assumed to be equal, and they are therefore placed at the angles of an equilateral triangle, with white in the middle; but the spectrum colors occupy the position indicated by the curved line" inside the triangle.

Sensations of Pressure. — Among the various modifications of consciousness produced by exciting that most essential of all the end-organs, the skin, what may be popularly described as the "feeling of being touched" stands first. Little of a scientific character, however, can be said about this class of sensations. Histology shows that the nerves distributed in the skin terminate either in free end-fibrils or in a variety of minute structures essentially alike ("corpuscles of Pacini," etc.). If a point of metal, wood, or cork be moved lightly over the skin, a great variety of sensations are awakened, but only at minute areas will there be a definite "content-full" sensation of pressure. Between these areas, either other kinds of sensations result, or else the pressure-sensations themselves are comparatively indefinable, and "content-less." These minute areas of greatest sensitivity are, then, properly entitled "pressure-spots." Their arrangement, as the following diagram (Fig. 6) shows, is customarily in

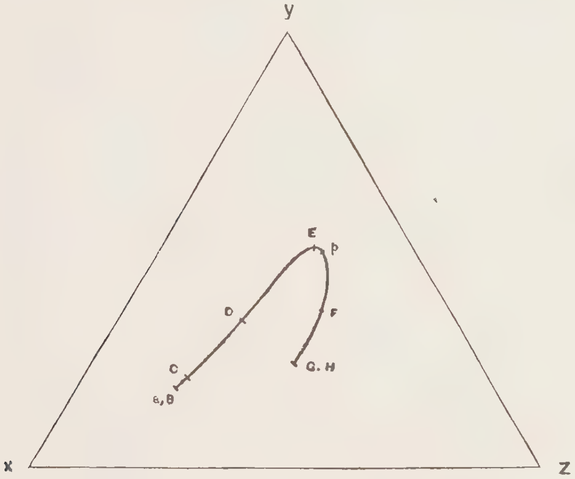

FIG. 5

chains which radiate from a kind of central point and run in such directions as to form either circular, longitudinal, or pyramidal figures.

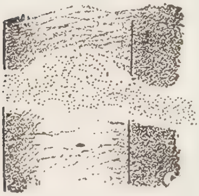

Fig. 6

Sensations of Temperature. — One of the most striking discoveries of modern experimental psychology concerns the origin of those modifications of consciousness which are called "feeling hot" or "feeling cold." "Heat-spots" and "cold-spots" (or minute areas of the skin sensitive to heat and not to cold, and conversely) can be located by experiment. These "temperature-spots" and the "pressure-spots" appear never to be superimposed. Their arrangement (see Fig. 7: *A*, "Heat-spots; *B*, "Cold-spots") is various; but the lines they form generally radiate from centres coincident with roots of the hairs, and run so as to cross each other.

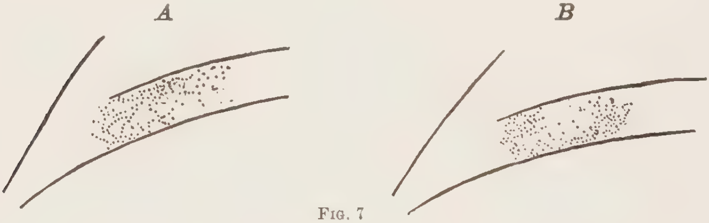

Fig. 7

It thus appears that the words "hot" and "cold," as applied to sensations, differ totally from the same words as used in physics. In physics, these words are relative terms. In psychology, they represent what is unlike and even opposed. Indeed, experience suggests that either the nervous apparatus, or the nerve-processes of the two kinds of sensations, must be different.

Muscular Sensations. — Few subjects of the kind have been more debated than the character, and even the very existence, of so-called "muscular" sensations. Do the changes which occur in the tissue of the muscles as they contract and relax modify consciousness? Physiology, introspection, and speculation (based upon the necessities of psychological theory) have all been appealed to; and they have all returned answer on both sides. We believe, however, in the existence and the influence of muscular sensations as an important factor for the development of mental life. That is, *certain rather massive differences in our sense-experience depend upon the quality and quantity of the nerve-commotions due to contraction and relaxation of the muscles located in different areas of the body.*

There are three sufficient reasons, however, why we do not ordinarily notice qualitative differences in the muscular sensations: First, the differences themselves are rather gross and are usually less important to attend to for purposes of nice discrimination. An important exception, however, must be made to this statement in the case of the muscles of the eye. Second, these sensations are "buried," as it were, in the perception of some object, or the doing of some work, on which the muscles are employed. And, third, these sensations are thoroughly fused with tactual and other specific sensations which are more distinct and obtrusive in their qualities and which have a stronger feeling-tone.

(1) Physiology and histology have perhaps not yet demonstrated the presence of sensory nerve-endings in such relations with the muscular tissue that changes in the latter *must* excite processes in the former. But they have made these relations possible, if not probable. In spite of the fact that cutaneous anæsthesia and paralysis of muscular sensibility usually go together, cases arise where one occurs and the other is absent. Some patients can discriminate weights when the muscles are called into play, after sensibility of the skin has been lost. M. Beaunis knew a singer who could sing almost as accurately as before, when the sensibility of the mucous membrane of the larynx and vocal cords had been destroyed. Lussana found a patient who retained muscular sensibility after losing sensibility in a large area

of the skin lying above the muscles. (2) Introspection, with attentive discrimination, seems to discern certain sensations which can be attributed neither to the skin nor to the joints. These are often localized much deeper than the skin-sensations, and appear when we lift unusual weights, or call out otherwise unaccustomed groups of muscles. (3) Consistent and satisfactory theoretical account of the origin and development of our perceptions of external objects seems to favor, if it does not imperatively demand (we believe the latter position tenable), the important assistance of muscular sensations. This will appear clearly in connection with the theory of perception.

Sensations of the Joints. — Another sort of modification of sense-consciousness, which, although ordinarily combined with tactual and muscular sensations, can be experimentally shown to have a separate character, is produced by the movements of the limbs over their articulating surfaces. The osseous extremities and their synovial membranes are found to be rich in minute nerves, and special end-organs exist in the neighborhood of all the joints. Goldscheider showed that, even with the hand held fast in a plaster cast, the least angular bending of the first joint of the finger could be perceived. But rendering the *joint* insensitive made it necessary to bend the finger far more than before in order to have its motion perceived at all.

Skin, *Muscles*, and *Joints*, — it is by complex sensations arising in them and fusing in different proportions, that, without sight or hearing, we know how to orient ourselves, whether actively or passively, in respect to the changing relations of our bodily members and of surrounding objects.

Organic Sensations. — The so-called "organic sensations" are fusions of various simple sensations, especially those of temperature and pressure, with characteristic painful or pleasurable feelings attached, that have become vaguely localized in the internal organs of the body. They are exceedingly manifold and variable; they become important factors in those perceptions and conceptions which make up our notion of the bodily Self. It is characteristic of them all that they are (1) comparatively "contentless," (2) obscurely localized, and (3) suffused with a strong tone of feeling — usually more or less disagreeable.

Sensations of each of the various classes differ among themselves in respect of both Quality and Quantity. If we may, for the moment, speak of them under the popular conception of "Feelings," we may say that in describing the sensory modifications of consciousness two questions may always be asked: *How* do I feel? and How *much* do I feel? The "how-I-feel" is called quality, and the "how-much-I-feel" is called quantity or intensity.

Relations of Quality and Quantity of Sensation. — It has just been said that quality may always, at least vaguely, be distinguished from the quantity of our sense-experience. But introspection, especially when assisted by experiment, shows that quality of sensation and quantity of sensation are intimately related. That is to say, it is difficult, if not impossible, to change the amount of any of the psychic processes called sensation, without also modifying its quality. In other words, as we experience *more of any kind* of sensation we notice that what we experience is *not precisely the same kind* of sensation.

Different psychologists have wished to lay the emphasis on one or the other of two conclusions concerning the nature of our sense-experience. Thus Sully says: "Quality is clearly distinct from quantity, and may in general be regarded as independent of it. That is to say, we can vary intensity without affecting quality." But Münsterberg declares that "quality and intensity are not two particular properties of the one sensation, but only the directions in which the sensation can be compared with other sensations." Strictly interpreting, we find neither of these authorities correct. Interpreting liberally, we find both of them correct. Thus, if I am going toward or away from a bell that is sounding, I ordinarily attend only to the changes of intensity; it is heard as the same bell-sound growing fainter or stronger. But if I also attend with a trained discrimination, I can become aware that, after all, it is a different bell-sound which I hear; it is a varying "clang," as the relations of the overtones to the fundamental tone keep changing.

The further scientific study of sensations requires, then, that we should investigate the two related subjects: (1) The conditions under which the qualities of sensations change; and (2) the conditions under which the intensity or quantity of sensations changes.

Quality of Sensations depends upon the Sensory Organism. — Those modifications of consciousness which arise when the organism of sense is irritated depend upon inherited and acquired characteristics of that organism. Any functional disturbance of the end-organs of sense impairs or destroys the "qualification" of the corresponding sensations. Soaking the end-organs of smell, or drying the end-organs of taste, changes the qualities peculiar to substances when tested by these organs. Certain persons are constitutionally capable of olfactory and gustatory sensations quite impossible for other persons. The same thing is true of dermal sensations. Stumpf, for example, tells of a German student of music who could not learn to play the violin correctly because, although not deficient in "ear," he could not secure the necessary variety of tactual and muscular experience. In sensations of sound a wide range of defects or excellences is possible. While even Helmholtz ceased to hear a musical sound when the vibrations were fewer than 34 to the second, Preyer claimed to hear the octave below. Turnbull's experiments showed that most persons cannot distinguish tones above $\mathbf{d}^7$ or $\mathbf{e}^7$ (about 20,000 vibrations to the second), but some persons can hear musical sounds an octave and more higher. Again, some are so "tone-deaf" that they cannot discriminate semi-tones and even thirds, while others can recognize 100–200 distinctions of pitch between successive tones of the ordinary scale.

The interesting phenomena of "color-blindness" illustrate the same truth. While 96%, or more, of people can distinguish the principal "hues" derived by mixture of all three of the fundamental colors, and thus are entitled to be called "trichromats," 4%, or less, can only distinguish the "hues" which are producible by mixture of two fundamental colors ("dichromats"). An unfortunate few are "monochromatic"; "as far as color is concerned there is no more meaning in it than there is to normal individuals in a photograph or an engraving" (Scripture). But both normal and color-blind persons differ in minute peculiarities. Even normal "trichromatic" eyes do not agree exactly in the proportions of the colors which they require to have mixed in order to match any other color in the spectrum.

As to the precise physiological reasons for so many individual variations, we are in almost complete ignorance. We can only reiterate our confidence that such reasons must exist. But this important psychological principle is undoubted: *The sense-experience of every individual is, so far as range of quality in each of the senses is concerned, peculiar to that individual.* Your world of sense-impressions and mine may differ more or less widely; one of us may be "quite shut out" of the world familiar to the other. It is certain that those two worlds can never be precisely the same. Your world of sense is *yours*, and mine is *mine;* yet we are living on terms of intercourse in the same world.

Quality of Sensations depends on Portion of Organ stimulated. — Even when the organ excited remains the same, and the kind of sensation following is not changed, changes of quality follow the movement of the stimulus over successive areas. The existence of pressure-spots, heat-spots, and cold-spots has already illustrated this. If we divide the retina of the normal eye into three zones, rays which, when falling on the polar zone, make an impression of red, yellow, or green, all make an impression of yellow a few mm. from the centre of the retina. On moving from centre to periphery, red may become orange, violet, then blue. *Every organ is a composite of a vast number of nervous elements; and this fact corresponds, in a general way, to the variations of sensuous impressions which its excitement produces.*

Quality of Sensation depends on Previous Excitement. — The entire nervous organism is active from the beginning to the end of life. No particular process can be set up in it anywhere without feeling the influences resulting from previous and simultaneous excitements of the same organism. The "principle of relativity," whose bearing on the development of mental life will become more prominent later on, is provided for by the very structure and functions of the nervous mechanism.

Thus smells and tastes, when closely successive, modify each other greatly. With two simultaneous odors, the stronger overwhelms the weaker; but sometimes the stronger also absorbs the weaker. Tastes often compensate each other, as the sweet sugar and sour lemon of the lemonade (Brücke held that the stimuli neutralize each other in the brain). The sensation produced by the same number of vibrations is not precisely the same when it is heard as the "sharp" of the tone below and the "flat" of the tone above, — as in the tempered musical scale. *In general, the quality of every sensation is dependent upon the condition of the organism and of the stream of sense-experience at the time when the effective excitement of the organism takes place.*

Two classes of facts show the modifying influence of the previous condition of the retina upon visual sensations: (1) the phenomena of "after-images" and (2) the phenomena of "contrast." (1) If we close the eyes after looking intently for a few seconds on any bright object, we find the image of the object remaining for some time, and only slowly fading away. Such an after-image is called "positive." But on watching a white positive after-image, it may be seen to pass quickly through greenish-blue and indigo-blue to a violet or rose-color. And if we look long at a small black square on a white surface, and then turn the eyes off to a white background, a bright square will appear and fade slowly away. Such sensations are called "negative after-images." In general, the color of such an after-image will be "complementary" of the color of the object. Positive after-images are often explained as due to *inertia*, and negative after-images to *exhaustion*, of the nerve-elements of the retina.

(2) The phenomena of contrast fall, at least in part, under the same principle. These phenomena are of two kinds, "color-contrast" and "contrast of brightness." For example, a small square of white on a green surface, when covered with transparent tissue-paper, appears as a pale red on a surface of whitish green. Every bright object appears brighter when its surroundings are darker than itself, and every dark object appears darker with objects surrounding that are brighter than itself. That is, sensations which are contiguous in consciousness tend to modify each other's character.

Quality of Sensation depends upon Variations of Stimuli. — The most ordinary experience suggests what physics and psychology combine to prove in detail: The modifications of our sense-consciousness vary with the kind of stimuli applied to the end-organs. If we select acoustic vibrations of sufficient intensity, with a rapidity of 435 per second, normal persons are affected by these with a peculiar auditory sensation, which is called **a**^{1} in the international musical scale. Sensations evoked by acoustic waves that have a rapidity twice as great, or one-half as great, stand to this arbitrarily selected sensation in a peculiar, pleasant relation. And between any two tones an octave apart, six others are made to stand in the following ratios: —

Name	*C*	*D*	*E*	*F*	*G*	*A*	*B*	*C'*
Relation of single vibrations . . .	1	$\frac{9}{8}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	$\frac{15}{8}$	2
Relative number of vibrations . .	8	9	10	$10\frac{2}{3}$	12	$13\frac{1}{3}$	15	16

Moreover, when two or more "clangs" are sounded together, the resulting complex sensation is either an agreeable or a disagreeable modification of sense-consciousness, which receives the name either of "accord" or "discord." The simpler the mathematical relation between the two clangs that are sounded together, the more perfect the accord. Thus, Octave (1:2); Twelfth (1:3); Fifth (2:3); Fourth (3:4); Sixth (3:5); Major Third (4:5); Minor Third (5:6).

In the case of color-sensations, variations in quality (the "hues" of the spectrum) change as the number of the oscillations changes. Thus, using the letters of the spectrum, physics gives us the following scale extending from 412 to 790 trillions of vibrations per second: *B* (450); *C* (472); *D* (526); *E* (589); *F* (640); *G* (722); *H* (790). Translated into the language of our sense-experience, this means that when the rays of light, so far as they modify consciousness at all, run in number up to and beyond about 412 trillions, we have sensations corresponding to the different varieties of Red; beyond about 470 trillions, our color-sensations take on a yellowish tone (Orange-yellow), and beyond 526 trillions become Yellow, — and so on, through greenish-yellow to Green, and bluish-green to Blue, and Violet.

In a word: *The peculiar characteristics of our sense-experience depend upon the varying kinds and amounts of those forms of nature's energy which stimulate the organs of sense.*

Quality of Sensation depends upon Time. — The "inertia" of all the end-organs of sense makes it necessary that the stimulus should take time in bringing the sensory processes to their maximum of intensity and of definiteness. On the side of consciousness, too, no sensation reaches its maximum of intensity or defines its own quality with a perfect definiteness, without lapse of time. The inertia of the end-organs, however, is very different for different kinds of sensations. And in our conscious experience the sensory modifications *grow* or *develop* into a perfection of their characteristic quality. Thus Cattell found that the time necessary to distinguish the different hues from a shade of gray of corresponding intensity varied as follows: for red, 1.28 σ; for orange, 0.87 σ; for green, 1.42 σ; for blue, 1.21 σ; for violet, 2.32 σ. The range of difference was from a minimum of 0.6 σ for orange and yellow to a maximum of 2.75 σ for violet. While we can discriminate several hundred sensations of sound due to the crackle of an electric spark or to contact with the tooth of a revolving wheel, in a second of time, without their "fusing," smells and tastes require a much longer period in order to define themselves.

It is a general principle that *even simple sensations, however instantaneously they appear to rise in consciousness, are really psychical developments; and that the full and precise quality of sensations is dependent upon the time allowed for discriminating consciousness.*

Quality of Sensation depends upon Intensity of Stimulus. — It has already been remarked that the amount of sensation influences the quality of sensation. "How much" we feel, and precisely "how" we feel, are not the same, but are dependently related. This influence itself depends upon the relation of conscious quality to the intensity of the external stimulus. For example, a white of less intensity is a shade of gray, and by diminishing the amount of light stimulus the sense-consciousness is modified from white to black, through all the shades of gray. At the minimum intensity of stimulus all the hues (except, possibly, the pure red of spectral saturation) appear nearly or quite colorless; they are no longer *hues*, in the strict meaning of the word. That is, the sensations, while losing intensity, have also lost their quality.

Quantity of Sensation. — Terms of quantity, when applied to our sense-consciousness, may appeal to incontestable experience. How a "strong" sensation differs from a "weak" sensation, even when the two are classed together as respects quality, I know just as immediately as I know how red differs from blue. On this immediate discrimination of degrees of sensation, by focusing and distribution of attention, the entire science of "psycho-physics" is built up. The application to conscious states of mathematical conceptions, and so of almost all forms of more exact experimentation, depends upon the same incontestable experience.

Measurableness of Sensation. — The attempt to measure *precisely* the amounts of our sensory experiences is full of difficulties, and some of the fundamental assumptions ordinarily involved in the attempt are debatable. For example, no one would misunderstand or dispute the statement: This sound seems to me louder than that; or, the light of this lamp is brighter than the light of the lamp yonder. Who, however, would venture to pronounce the greenness of this bit of grass precisely 40 % more than the olive of that bit of evening sky; or the smell of this violet just one-half as strong as the taste of his morning's cup of coffee?

The fundamental truth of experience is simply this: Different sensations do actually differ as respects the way in which they answer the question, How much? A certain amount of ability for discriminating changes of degree in the intensity of sensation is possessed by every one. Moreover, such ability may be cultivated, and the results of experiment may be used in constructing a theory of the quantity of sensations. At the same time what is measured is not an entity or static condition of the mind. *It is rather our discriminating consciousness of the relative amounts of the sensory affection of successive conscious states.*

The discussion of the measurableness of conscious states in general, and of the applicability of the "category of quantity" to them, as well as of the most accurate means for measurement, has been given much prominence in modern experimental psychology. Some writers have even gone so far as to deny that we interpret correctly the modifications of consciousness when we speak of them as *changes of quantity.* But others have used terms such as "threshold of consciousness," "unit of measurement," "psycho-physical science," etc., as though mental phenomena were "thing-like" entities of a geometrical order to which some kind of an actual measuring-stick could be applied.

Maxima and Minima of Sensations. — In the case of each of the senses, there are certain *limits* within which quantitative changes have their range. The answer to the question, *How much* do I feel? can never be either *more than* or *less than* so much. There is, therefore, both a "lower" and an "upper" limit to every kind of sensation-experience. Both these limits differ for the different senses, for different persons, and for the same person under different circumstances.

We may express all this concisely by some such formula as the following: If we let $\mathbf{R}$ = the range of sensation, or number of differing intensities of any kind of sensory experiences discernible by the individual, $\mathbf{S}$ = the sensitiveness of the individual to minute changes of intensity in any particular kind of sensation, and $\mathbf{C}$ = the capacity, or amount of stimulus which the particular sense is able to receive, then $\mathbf{R} = \frac{\mathbf{C}}{\mathbf{S}}$, where $\frac{1}{\mathbf{S}}$ (or the "unit of sensitiveness") is made the standard measure. In this formula $\mathbf{R}$, $\mathbf{S}$, and $\mathbf{C}$ appear as dependent variables.

The "lower limit" of sensation for the different senses has been investigated experimentally with a variety of results. Earlier results (Aubert and Kammler) made the lightest weight which gave pressure-sensations 0.002 gramme on the forehead, and 0.005–0.015 gramme on the volar side of the fingers. More recent experiments (Langlois and Richet) found that the coefficient of sensibility for the muscles used in respiration is very low as compared with that of the muscles of the limbs and trunk. A movement of the eyes answering to a contraction of only 0.0006 mm. of the inner muscles of the eyes can be detected. The skin is, under favorable circumstances, about as sensitive to changes in temperature as a good thermometer ($\frac{1}{5}$° Fahr., or less). It has been calculated that work done on the ear-drum amounting to only $\frac{1}{543}$ billionth kilogramme-meter will, under the best conditions, give rise to a sensation of sound. Aubert fixed the lower limit of light-sensations at $\frac{1}{300}$ of that reflected from white paper under the full moon. Some persons can taste one part in 392,000 of quinine, or even one part in 1,280,000 of strychnine. And it is claimed that the incredibly small amount of $\frac{1}{460000000}$ milligramme of mercaptan has been smelled.

Obviously, it is unsafe to the organs or impossible experimentally to determine how much of most forms of sensory stimuli can be experienced as quantity of sensation (the "upper limit").

General Quantitative Relations between Sensations and Stimuli. — It is obviously an interesting problem for psycho-physics to discover the law which controls the relations between changes in the amount of external stimulus and resulting changes in our sensory experience. The most ordinary observation convinces every one that, in general, increase in the amount of stimulus results in larger amount of sensation; and *vice versa*. But only a little more observation is necessary in order to make it obvious that these two kinds of increase or decrease do not vary in the same proportion. For a long time astronomers have known that, if the stars are classified according to their *apparent* brightness (the amount of the sensory impression), this classification does not correspond to the *absolute* brightness of the stars as determined by physical measurements.

About the middle of this century Weber published the results of experiments undertaken in the direction of finding some formula which should express the general relation referred to above. His method of experiment was to discover how much a weight must be decreased (or increased) in order that the difference may be just noticeable. Similar experiments followed, by him and by others, with pressure-sensations, with sensations of sound, of light, and even of taste and smell — although the two latter do not easily lend themselves to experimental determination. The result was the announcement of a general rule called "Weber's Law": *For any given class of sensations, the least noticeable difference is a constant fraction of the sensation.* This law may be stated in several different ways; among others, the following: The strength of the stimulus must increase in geometrical proportion, if the estimated strength of the sensation is to increase in arithmetical proportion. Translated into plainer terms of experience, this means: If you want to produce an appreciable change in the amount of any sensory impression, you must add to, or subtract from, the stimulus a nearly uniform proportion of the amount. For it is *change* rather than *absolute amount* of sensation-experience which is consciously measured.

Validity of Weber's Law. — The above-mentioned formula turns out, as tested by actual experiment, only approximately correct. For the median ranges of sensation, especially of visual sensations and pressure-sensations, it is most nearly exact. Near the upper and lower limits, and in complicated and nice comparisons, many confusing considerations seem to influence our discriminations. Making allowances for these, however, we may pronounce this formula to be a valid psycho-physical law — so far as such a term can properly be applied to conscious phenomena.

To illustrate Weber's law: if for a weight of 10 oz. we fail to perceive a difference of less than 1 oz., we shall fail under similar circumstances to perceive a difference of less than 1 lb. in 10 lbs. ("least perceptible difference" = $\frac{1}{10}$).

The following list gives specimen results of experiments in various senses. [If the law were absolutely exact, the fractions would remain unchanged; but the series, as given, show how the results fluctuate as the stimulus increases] : —

(1) Intensity of sound (noise of falling ball) with a range from 1 to 10,000: $\frac{1}{12}$, $\frac{1}{17}$, $\frac{1}{19}$, $\frac{1}{21}$, $\frac{1}{26}$, $\frac{1}{23}$, $\frac{1}{26}$, $\frac{1}{20}$, etc. (2) Intensity of light (gray disks) with range from 10 to 1000: $\frac{1}{122}$, $\frac{1}{122}$, $\frac{1}{122}$, $\frac{1}{122}$, $\frac{1}{122}$, $\frac{1}{121}$, $\frac{1}{118}$, $\frac{1}{117}$ $\frac{1}{109}$. (3) Lifted weights, from 1 to 4000: $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{11}$, $\frac{1}{14}$, $\frac{1}{15}$, $\frac{1}{16}$, $\frac{1}{19}$, $\frac{1}{20}$, $\frac{1}{18}$, $\frac{1}{25}$, $\frac{1}{40}$.

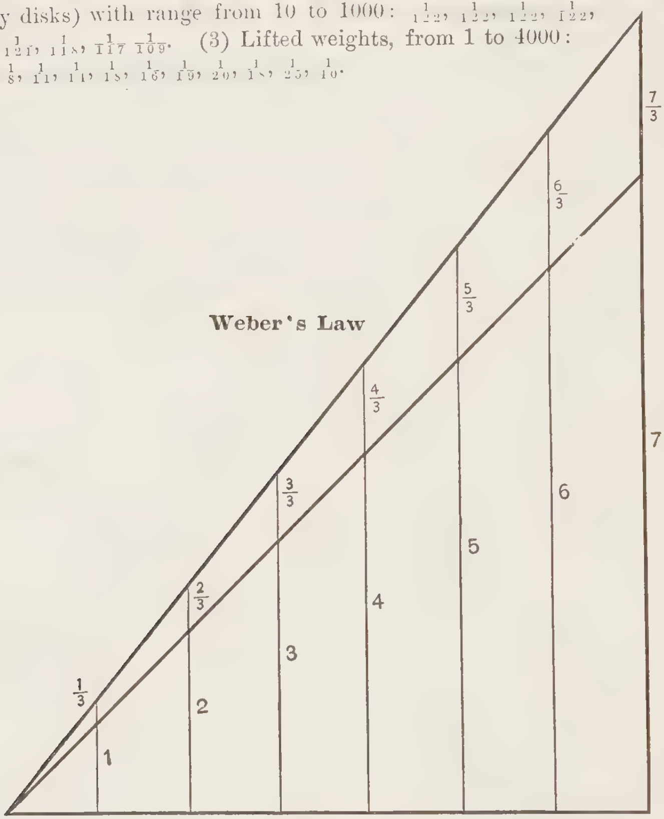

Fig. 8

The exact expression for Weber's law is $\frac{\mathbf{a}}{\mathbf{R}} = \mathbf{C}$, where **R** denotes the amount of the stimulus, **a** the amount of the least noticeable difference, and **C** a number fixed for the particular person, under certain circumstances, and a particular form of sensation. The proportions of the lines in the accompanying diagram illustrate the same law (see Fig. 8). The vertical lines 1 to 7 represent stimuli of different intensities; the least noticeable difference is supposed to be $\frac{1}{3}$ of the stimulus.

Fechner's Law. — In accepting and modifying Weber's law, Fechner made two suppositions: (1) The least perceptible difference always means to us the same thing mentally; it may therefore be treated as a constant quantity. (2) What is true for finite differences will be true for infinitely small differences.

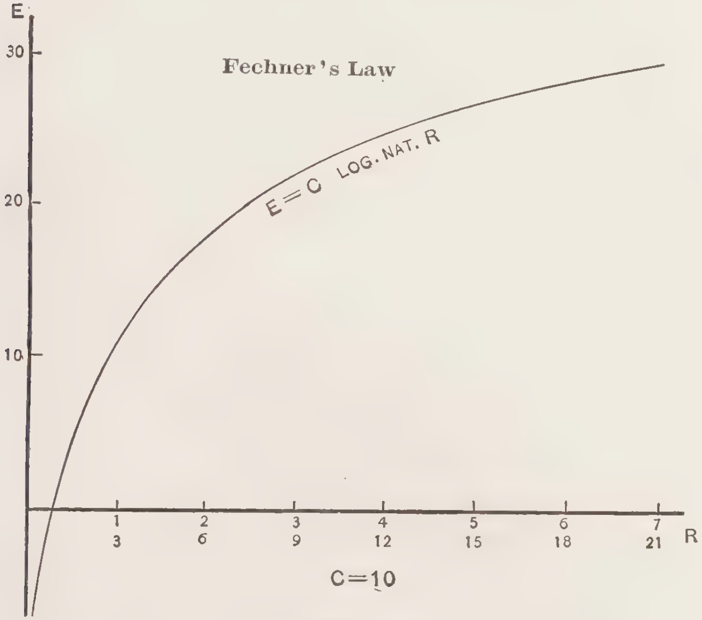

Fig. 9

With the two foregoing suppositions we have the experimental results treated by this distinguished physicist and psychologist as the basis for the most wide-reaching metaphysical theories of the relations of body and mind, and of matter and mind generally. But this, as we have already indicated, is to treat the noticeable psychical changes in quantity as though they were entities. The psychologist can only accept this law as tested by its ability to furnish a brief expression for a series of observed psychical facts.

In the mathematical statement of Fechner's law we have $\mathbf{dE} = \mathbf{C}\frac{\mathbf{dR}}{\mathbf{R}}$, where $\mathbf{R}$ = the amount of the stimulus, $\mathbf{dR}$ the increment of the stimulus, and $\mathbf{C}$ the same kind of a constant as that denoted by this letter in formulating Weber's law. Hence $\mathbf{E} = \mathbf{C} \log \mathbf{R}$; or the amount of the sensation ($\mathbf{E}$) varies as the *natural* logarithm of the stimulus ($\log \mathbf{R}$) and the constant as before ($\mathbf{C}$). The same law is expressed in the accompanying figure (No. 9), where the values of the stimuli are laid off on the horizontal line. The upper row of figures gives the value of the stimulus in physical units, *e.g.*, grammes; and the lower row gives the same values with the least noticeable sensation as a unit. Then for each value, as expressed in terms of the least noticeable sensation, we may count off on the vertical line (the "scale of sensation") a number equal to the natural logarithm of that value. The constant for each individual case (in the figure, $\mathbf{C} = 10$) adjusts the scale of sensation to its proper height.

Education of the Senses. — The purely psychological view of the nature and development of our sense-experience has most important bearings upon the genesis and training of the life of the senses. Sensation has been seen to be a *psychical process* involving an original forthputting of mental life, and requiring the development of attentive, discriminating consciousness. Its conditions are, then, exceedingly varied, both physiological and psychological. By attentive and educated discrimination it is possible enormously to extend the range of this sense-experience, with all that such extension implies and produces. The very existence of a considerable part of this experience depends upon education. He who educates himself or others, thereby makes possible for himself and for them a world of sensuous richness and beauty from which the uneducated mind is entirely shut out. He also trains the intellect, at its very foundations and in most effective fashion. For the world of our sensation-experience is not a ready-made affair. It, too, is a world of mind. It is a world to be created and appreciated only by a trained use of the senses.

[The literature accessible for the study of the psychology of sensation is especially rich. Brief popular introductions are McKendrick and Snodgrass: Physiology of the Senses; Bernstein: Five Senses of Man. More detailed treatment may be found in Mach: The Analysis of the Sensations; and Scripture: The New Psychology. The more advanced student may be referred to the monographs of Helmholtz: Physiologische Optik und Tonempfindungen; Stumpf, Tonpsychologie; and E. Gurney: The Power of Sound. The experimental and theoretical discussion of Weber's and Fechner's law has called forth such monographs as Fechner's Elemente d. Psychophysik; G. E. Müller: Zur Grundlegung d. Psychophysik, and others. Most students, however, will find quite enough to start and guide their inquiry in Ladd: Elements of Physiological Psychology, pp. 356–381; and James: The Principles of Psychology, I, pp. 533–549.]

CHAPTER V

FEELING

There is no other possible way of telling "what it is to feel" than by appealing directly to the experience of feeling. *The very life and essence of feeling is in being felt.* Feeling cannot, therefore, have its intrinsic nature defined in terms of knowledge.

Nature of Feeling. — The favorite description of the peculiarity of affective or emotional consciousness is to call it "subjective." Thus one writer says that the term feeling is used to "denote the subjective aspect of consciousness anywhere and everywhere"; and another declares: "Feeling is subjective experience *par excellence.*" There is a side of truth in such statements. We have seen that, from the psychologist's point of view, all experiences or conscious states are regarded as *of* the subject, that is, as subjective. But we have also seen that sensations are such experiences as become for us peculiarly *objective;* for by means of them the qualities of things are known. Things may, indeed, cause important modifications of my feeling consciousness; this happens when I am stung by a bee or am given pleasure by listening to a skilled player on the violin. Still the pain and the pleasure not only *are mine*, but they *are not* transferable to the objects which cause them. Modify the words as we will, we cannot conceive of our pains and pleasures as qualities of things. The feelings, then, are peculiarly subjective, as distinguished from the objectivity which visual, tactual, and auditory impressions come to have.

Feeling as Primary. — Various attempts have been made to treat all forms of feeling as derivative and secondary.

But these attempts have failed; and they always will fail, for the very good reason that the affective aspects of our conscious states are immediately and indubitably recognized as something essentially different from our thoughts or ideas or deeds of will. There is no distinction which men make any more readily or incontrovertibly than the distinction between how *they feel* and their own perceptions or ideas as to how *things behave*, or their own resolutions to *effect changes* in things. In saying this, however, it is not meant to contradict the truth already repeatedly asserted; namely, all three fundamental forms of mental life are given in the unity of one consciousness. Still, as Dr. Ward has declared: "Feeling, as such, is, so to put it, matter of *being* rather than of direct knowledge."

Several incorrect views as to the nature of feeling meet us at the very threshold of the subject. They all seem among the most astonishing of psychological vagaries, so flatly do they contradict the plainest deliverances of consciousness, and so incapable are they of adapting themselves to the needs of a comprehensive and satisfying psychological theory. Among such views the following three require mention. First: the *physiological theory* of feeling begins by affirming that all affective modifications of consciousness, as such, are only a becoming-aware of the condition of the nervous system under the action of varying quantities of stimuli. To this it is quite sufficient to reply that the very conception of feeling is not "a becoming-aware" of anything, but "a being affected" somehow; and further, that the most refined physiological research has not as yet made us immediately aware of the conditions of the nervous system which accompany the varying kinds and degrees of feeling. How can my being in such, or such, a state of feeling be identified in nature with any doubtful physiological theory?

But, second, the *Herbartian theory* of feeling makes the existence and characteristics of feeling dependent upon the character of the ideating activity; and this in such a way that the feeling, as such, is the becoming-aware of the reciprocal action of the ideas. As the most masterly writer (Volkmann) of this school declares: "Feeling is to be considered as the consciousness of the process of ideation itself, as distinguished from consciousness of this or that particular idea." Now that our thoughts and ideas do influence our feelings is a plain and popular statement of the truth of experience. Moreover, that the flow of the stream of ideation and thinking makes itself felt in peculiar forms of accompanying feelings is a psychological principle which needs to be further examined. But when the most primary conscious experiences are identified with the recognition of an abstruse and doubtful mathematics of ideation, the testimony of the "inner witness" is quite too much strained in the interests of a school of psychologists.

The *third theory* of the nature of feeling *identifies all feeling with pleasurable and painful sensations.* Biology, invading psychology, has favored this theory. The apparent fact that certain minute areas of the skin, when stimulated, are more sensitive to such excitements as result in disagreeable (or agreeable) modifications of consciousness has furnished warrant for a leap to the tremendous conclusion: All feelings, as such, are reducible to the "pleasure-pain" series of sensations. This leap accomplishes two things at once: it takes the place of proof that all agreeable and disagreeable consciousnesses are to be classed with sensation-experiences; and it assumes that all feelings, as such, are only different intensities of such agreeable and disagreeable consciousnesses (*i.e.*, belong to the pleasure-pain series).

The theory which maintains that the pleasure-pain sensory modifications of consciousness constitute all there is — so to speak — of human feeling, as such, is confuted at every point by psychological considerations: (1) The conviction that human feelings are fitly spoken of as ethically "noble" or "base," and as æsthetically "refined" or "coarse," may be appealed to in refutation of this theory. (2) Without discriminating consciousness we cannot, of course, know our own feelings as differing either in kind or in degree. By attentive discrimination, however, I do recognize many important differences of quality just as immediately and indubitably as the varying degrees of intensity to my pleasures and pains. How can it be maintained in the face of consciousness that the feeling of *surprise* does not differ in quality from the feeling of *expectation*, —either of which may be more or less painful or pleasurable? Does the feeling of *doubt* differ from that affective consciousness which we call *conviction*, only by having a different place in the intensity belonging to the pleasure-pain series? But (3) this theory is self-contradictory throughout. For by arranging our pleasures and pains along a scale of intensity and then applying a compound term to all members of the scale (namely, "pleasure-pain") we do not annul or explain, the distinct difference between pleasure and pain themselves. Pleasure and pain *are* left different in some characteristic other than mere differences of quantity. They are so different that they may fitly be called "opposites," and placed at different poles. But what common characteristic renders it possible to class these opposites together, except just this; they are both *feelings?* The theory is forced to hold, then, that two kinds of feelings, as such, which are inherently different in kind, may run along parallel so far as quantity is concerned. But this contradicts the fundamental assumption of the theory.

Physiological Conditions of Feeling. — Although all affective modifications of consciousness cannot be reduced to physiological processes of which we are conscious, a plausible view may be formed of the physiological conditions of these peculiar psychical processes. Investigation, however, has as yet only made it possible to propose a view that may claim to be plausible. Two classes of facts require to be explained: first, the changes in kind of our conscious states of feeling; and, second, the rise and fall in degree of the different kinds of such conscious states. We believe that the best account of the physiological conditions of all the feelings is afforded by the following principle: *At any particular moment the kind and amount of feeling experienced has for its physiological condition the total complex relation in which all the subordinate neural processes, set up by the stimuli of that moment, stand to one another and to the "tendency," or direction, of preexisting related neural processes.*

In giving the detailed proof of the foregoing conjecture, one remarkable difference between the conscious processes which psychology treats, and those processes in the brain which are supposed to be specially connected with the conscious processes, demands consideration. So far as anything can be known about the processes of the brain, they are all of *one kind*, essentially *alike.* They are chemico-physical changes,— movements of the molecules and atoms of the cerebral substance. The brain, like every material thing, can only be the subject of movements. But we have seen that discriminating consciousness analyzes the conscious processes into *three* essentially *unlike kinds*, although all three are found together in the unity of the stream of consciousness. These three processes are perceiving or thinking somewhat, feeling somehow, and doing something. The "feeling somehow" must, then, have its physiological conditions in some kind and degree of molecular movements in the nervous system — especially in the substance of the brain.

The following considerations support our theory of the physiological conditions of all feeling-consciousness. (1) We have little knowledge by immediate perception of the size, shape, temperature, and movement of the intercostal and visceral organs. But from all these organs an indescribable *mixture* (or *mélange*) of nerve-commotions is ceaselessly ascending through the cerebro-spinal tracts to the brain. It is chiefly this which gives conditions to our emotional tendency, or mood, or temporary impulse. It is largely productive of that class of bodily feelings which forms so much of the "feeling of self," as in this or that "temper" or "mood." As long as this mixture corresponds in character to that to which we are habitually accustomed, we say that we "feel like ourselves"; when it departs from this customary type, we say we "feel queer," or "not a bit like ourselves."

(2) This crowd of cerebral nerve-commotions, when much increased in number and intensity, becomes a sort of "surplusage," or semi-chaotic and overflowing quantity not adapted to be elaborated into the sensuous basis of definite perceptions and ideas. Intense and confusing forms of feeling result, such as those of *excitement*, *hurly-burly*, *bewilderment*, etc.

(3) The nerve-commotions, when they enter the centres of the brain and diffuse themselves there, always encounter a certain condition of those centres as respects the amount and kind of nervous excitement already existing in them. The relation in which the incoming crowd of nerve-commotions stands to the previous condition of excitement determines the character of the feeling called into consciousness. The feeling of *ennui* or *monotony* indicates little or no change in the kind and amount of the obscure crowd of entering nerve-commotions. The feelings of *surprise* and *shock* indicate an opposite relation. The painful feelings which are produced by sudden

and uncertain changes in the stimuli — as by a "flickering" light or an "interrupting" and "shocking" noise — indicate a "more or less profound troubling of the organism."

(4) The characteristic feelings of the two sexes and of the different ages are explained in the same way. The rapid metabolism of the infant, and the sluggish digestion and circulation of old age, give conditions to the characteristic feelings of each time of life. And every particular strong emotional stimulus has its effect as a "semi-chaotic" surplus relative to the entire life of the bodily system. Thus intense sensations are enjoyable to a hearty and mature body, but are painful to the weak and undeveloped organism.

The Kinds of Feeling. — What are called "feelings," in the language of every-day experience, are very complex conscious states. They are never *merely* affective or emotional, but are fused or associated with simultaneous perceptions, thoughts, ideas, and deeds of will. In this way the description of these complex examples of the developed life of the mind becomes greatly complicated. The only available means for classifying the feelings is to take account of these connections. According to the connection or reference of the complex modifications of consciousness, when considered "feeling-wise," the following classes may be distinguished: (1) Sensuous Feelings, or such as are dependent upon the different qualities of the special senses and of so-called "common feeling"; (2) Intellectual Feelings, or such as depend upon the character of the processes of ideation and thought; (3) Æsthetical Feelings, or such as arise in connection with the perception or imagination of what we call "beautiful" or its opposite; and (4) Ethical Feelings, or such as arise in contemplation of those forms of conduct which we call "right" or its opposite.

Sensuous Feeling. — Certain emotional modifications of consciousness attach themselves to all our sensations, — more obviously to the more intense sensations, — and thus constitute the subjective side of sensation-consciousness.

The phrase "sensuous feelings" emphasizes the subjective side of all sensory experience. Popular language recognizes the fact that sensations of smell and of taste, for example, may be described as "heavy," or "enlivening," or "spicy," and as "exciting" or "depressing." This description emphasizes something in them, however, besides their intensity or their characteristic sensation-quality. The "affection" produced, for example, by the heliotrope is different from that produced by the Japanese lily. This is, in its way, as true as that one sensation must be called the smell *of* the heliotrope, and the other sensation the smell *of* the lily; while both may be of about the same degree of magnitude and equally pleasing or displeasing. Sensations of touch, of temperature, and of muscular activity, differ in their characteristic accompaniments of feeling. We cannot easily "feel" grave and dignified when our muscular and tactual sensations are such as accompany a mincing walk or a hop-skip-and-jump. We cannot have the comfort of feeling "cuddled," and of feeling "buoyant" in motion, at one and the same time.

Musicians have always attached different kinds of feeling to tones of different *timbre*, to different keys and chords and intervals. Such distinctions may easily be run out into the regions of fancy; but they are based on indubitable facts of human affection. Stumpf — musician as well as psychologist — tells how his son Rudolph, a child of four-and-a-half years, when he had to choose between two trumpets which differed by a tone, preferred the "darker one." The "grave" pleasure of feeling belonging to the bass register differs in another way than that of mere intensity from the "stirring" of feeling by a tenor voice. And who that knows anything about music could fail to discriminate, as of a markedly different quality, the "sweet-pain" of minor strains and the "strenuous sweetness" of a high-pitched major? The feeling of "grace" which belongs to Mozart's Opus 46 in E flat is not the same kind of pleasure as the feeling of "passionate fervor" belonging to his Opus 47 in G minor.

The feelings which fuse with the different sensations of light and color, or which follow upon attending to the characteristic quality of these sensations, have been differently described by different persons. That such feelings are a genuine factor in consciousness our most common forms of speech abundantly show. Some colors are "cheerful" and others are "mournful." Some shades and tints are "warm" and others are "cold." To account for the exciting influence of red upon many animals, by its conscious association with the sight of blood, seems unsatisfactory. This influence is more like that experienced by many persons on receiving the impression of certain smells. Höffding calls upon us to observe how, with increase and diminution in the amount of illumination, "the effect on feeling sustains a corresponding change." It is well known how much significance for feeling Goethe found in his experience of the different colors. The misfortune of seeing the world through "jaundiced eyes" is not merely a pathological affair.

The important modifications of "common feeling" and of the "feeling of self" which accompany disturbance of the obscure and mixed sensations that arise from the internal organs of chest and abdomen are well known. Not infrequently these disturbances lie at the base of serious perversions of the entire current of mental life. The man who feels his own heart or other viscera in unfamiliar — not to say painful — ways, begins by feeling himself "queer"; he may end by not feeling "at all like his old self," and even with the partial or almost total obscuration of his conceptions of self.

Feeling of Relation. — So far as is necessary for our present purpose, the feeling of relation may be treated as the one formula applicable to many of the higher intellectual, æsthetical, and ethical emotions and sentiments. Here the general principle may be stated as follows: *The character and rate of the change which takes place in the sensational and ideational factors of the stream of consciousness determines certain characteristic "affections."* All the affections may be considered, on one side, as different forms of the "feeling of relation." Both Mr. Spencer and the Herbartians are wrong in their view of the nature of thought and of feeling, in this mutual dependence. But both are right in insisting upon the important truth, too much neglected by most other psychologists: *One feels, as well as knows, the characteristic differences in the flow of the "stream of consciousness."*

The *time-rate* of the change in our sensations and ideas determines certain feelings of relation. A fairly rapid and yet equable flow of the processes of ideation, perception, and thinking, produces feelings of pleasurable excitement — of being alive in a safe and controllable way. But too rapid flow of these intellectual processes produces the feeling of confusion, of being "run away with" by one's own sensations or ideas. On the contrary, too slow a pace to the same processes occasions feelings of languor and drowsiness, or of tedium and depression of spirits. The emotional experiences which characterize insane "melancholia," on the one hand, and insane "mania," on the other hand, depend largely on the time-rate of the sensory and ideational processes.

It is probable that all the more primary intellectual processes have their characteristic accompanying feelings. Children often *feel* what they hear read or said, with an appropriateness which quite outstrips their powers of understanding. The impulse to resist, or to obey, may be aroused through the feeling with which the words of a command are uttered. And all language, as will appear more clearly later, is as truly adapted to express and to arouse the affective and emotional side of consciousness as its more ideational and conceptual side. For each of the simpler intellectual processes is *felt* as it is performed by the attentive and discriminating mind. The perception of the similar is excited and guided by the feeling of recognition. The feeling with which we greet the contrasted or the opposite is a yet different affair. It would even appear that men "feel their way" to right conclusions in argument; and that they accept or reject the expressed conclusions of others, largely as those conclusions modify their affective consciousness. Correct memory, too, is helped out and confirmed by a certain form of feeling; incorrect memory is checked and chastened by a different form of feeling. More complex feelings of relation will be considered later on.

But the illustrations of our contention are without number. They comprise the entire field of mental life. We can only, at present, remark again how deplorably meagre is that view of the nature of human feeling which reduces it to terms of the varying magnitudes in a certain kind of sensations called either pleasure or pain.

Feeling as "Pleasure-Pain." — Although affective modifications of consciousness cannot properly be described as mere variations in intensity of pleasure and pain, the terms "agreeable" and "disagreeable" undoubtedly apply to most of our feelings. For example, the feeling of surprise may be of such a "tone" or character as to be welcome; on the contrary, it may be more or less repulsive. The same thing is true both of all our simpler and our more complex forms of feeling. The fact that in developed mental life we can often (but by no means always) give *reasons why* the particular feeling is agreeable or disagreeable, does not at all disturb the more fundamental fact; *feeling, as such, is agreeable or disagreeable.* This fundamental fact has been expressed in many ways; and psychologists have hotly debated over the way of expressing the fact. We repeat: the fact is that most of our feelings are either agreeable or disagreeable; but we cannot account for the variety of our feelings, as such, by resolving them all into these two kinds of characteristics which most feelings possess.

This general relation of pleasure-pain to the affective modifications of consciousness we prefer to indicate by calling pleasure and pain (or the being agreeable or disagreeable) the "*tone*" of feeling. Any one who does not like this figurative phraseology is at liberty to adopt a better — only if, however, he thus provides for all the facts of experience.

General Influence of Pleasure-Pain. — It is scarcely necessary to dilate upon the influence over human life, whether it be that of the individual or that of the race, which is exercised by the various forms of pleasure and pain. The poets have emphasized this influence; we may recall in this connection Schiller's "Hunger and Love" as the great impulses to live and to work. Political economists have often rather overdone the same thing in the interests of the lower forms of happiness and unhappiness so-called. Yet we may well exclaim with them: "It is difficult to conceive what life would be if pleasure and pain were stricken out . . . leave them out, and life and the universe no longer have meaning." It needs to be noticed, however, that, while the popular usage tends to restrict the word "pain" to experiences which are sensuously disagreeable in a high degree, psychology covers all degrees and kinds of the agreeable and the disagreeable with the compound word "pleasure-pain."

Neutral Feelings. — That most affective experiences have some slight degree, at least, of the pleasure-pain characteristic — some "tone" — is admitted by all. But it has been much debated whether any of our feelings are absolutely without such tone. Neutral or indifferent feelings were recognized by Reid, but disputed by Hamilton. James Mill asserted that the greater part of our sensations are colorless as respects the pleasure-pain qualification. Bain, too, claims that "we may feel and yet be neither pleased nor pained." And Wundt has attempted to prove by plotting a curve for the varying intensities of the two opposites, pleasure and pain, that we cannot pass from one to the other without going through a "zero-point," or point of indifference. Experience, however, does not seem uniformly to correspond to the continuous flow of a curved line; as in the case of a child stung by a bee while it is eating honey. On the other hand, many psychologists have attempted to prove the contention that we always feel at least slightly pleased or slightly pained. And even Lotze has said: "We apply the name 'feelings' *exclusively* to states of pleasure and pain in contrast with sensations as indifferent perceptions of a certain content." Of course, those whose theory identifies feeling with pleasure-pain cannot consistently speak of *neutral* feelings.

The truth seems to be that in fairly good health, and when occupied with work not decidedly distasteful, men pass much of their time without any conspicuously conscious tone of pleasure or pain characterizing the stream of consciousness. But there are few, if any, feelings which do not develop some pleasure-pain tone when they are made the objects of purposive attention. To make, offhand, as it were, a uniform law seems scarcely warrantable. Nor does there seem any good reason to be adduced why the experience of all persons should follow a uniform law in this regard.

Conditions of Pleasure-Pain. — Biology has attempted to handle the problem of the origin of our pleasures and pains. But it can only assist psychology by showing how increased intensities of pleasure or of pain may become *attached* to certain physiological functions in accordance with the biological principle of evolution. Here both biology and psychology have to assume the existence of this characteristic tone of the subjective side of consciousness. It is rather in the study of ethics, of æsthetics, and of social phenomena that satisfactory "reasons" in the place of partial causes for many of the phenomena may be found.

Even the immediate physiological conditions of our pleasures and pains are obscure. Observation and experiment have as yet established no universal physiological law bearing upon the subject. The most important and indisputable generalization has reference to the dependence of the pleasure-pain tone of feeling on the varying intensities of the stimulus. We shall refer to this later.

It has been claimed that the existence of so-called "pain-spots" in the skin is demonstrated by experiment; and that therefore we are warranted in classifying our pains with the specific sensations. Apparently, however, all that has been shown is this: certain minute areas of the skin are relatively sensitive to stimulation; they respond with sensations of a painful tone, under lower intensities of stimulus. The sensation of touch and the feeling of pain, both due to stimulating the same areas, are sometimes separable both in time and in fact; and disease may render a certain member of the body insensible to pain and not to touch, and conversely. Severe cold, chloroform, and hypnosis, sometimes occasion the same separation of the sensation of pressure and the so-called sensation of pain. But these facts do not prove the character of pain as a specific sensation. They rather constitute an argument against identifying any sensation with the painful tone of feeling which is its customary accompaniment. The separation in time, in such cases, is explained by the physiological fact that the nerve-processes on which the pain is dependent are the more widely diffused, both peripherally and centrally. There is abundant proof that such processes travel more slowly than the sensory processes; for when one is struck a smart blow, the perception of being struck comes first, and the pain of being struck follows after.

Statements such as that "pleasure is the positive feeling of a thing which accords with our nature, as pain is the negative feeling of an object which is contrary to our essence," are more sonorous than illumining. The same criticism seems to us to apply to Grant Allen's declaration: "Pleasure is the concomitant of the healthy action of any or all of the organs or members supplied with the afferent cerebro-spinal nerves, to an extent not exceeding the ordinary powers of reparation possessed by the system." Mr. Allen has himself characterized as "too vague" the theory of Bain which connects states of pleasure with an increase and states of pain with an abatement of some, or all, of the vital functions. Lotze's view is more tenable: "Feeling (that is, as pleasure and pain) is only the measure of the partial and momentary accord between the effect of the stimulus and the conditions of vital activity."

No merely physiological theory yet proposed is entirely satisfactory in explanation of our pleasures and pains. All such theories are subject to the following, among other, objections: (1) There is no proof that many slight and yet disagreeable intensities of certain stimuli are harmful, except the conjecture which the theory supports. (2) These theories neglect too largely those conditions of the central nervous system in which (rather than in conditions of the organs exposed to the stimulus) the very nature of our pleasure-pains has its physical basis. (3) These theories offer no explanation of the large field of pleasures and pains that are non-sensuous.

Intensity of Excitement and Pleasure-Pains. — The one thing which is most indubitably known about the primary causes of disagreeable or agreeable feelings is that their tone is dependent upon the amount of neural excitement. It is this fact which shapes almost all the language with which the characteristics of feeling are expressed. Men speak of being "pierced" or "crushed" with sorrow; of being "overwhelmed" in a sea of pain. Their pleasures are characterized as "refined" and "gentle" or as "coarse" and "strong." But the amount of various sensations, or of the different intellectual and æsthetical processes, which different individuals can "*bear*" (how expressive this word!) differs enormously. A somewhat complex, and necessarily rather indefinite, formula may be used for the entire set of relations which is maintained between intensities of excitement and the resulting pleasure-pain. That is to say: *How much in amount of neural processes can be "borne" without pain, or even enjoyed, varies with an indefinite number of considerations resolvable into the constitution, habit, present condition, and "occupation" of the centres of the brain.*

The principle just stated is illustrated by all the recent experiments which have dealt with the question. For

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example, the following table summarizes results reached by Dr. Griffing on the amount of pressure in kilogrammes which just reached the "threshold of pain" in the several classes of persons experimented with. The same stimulus applied to corresponding organs in different human bodies may occasion different amounts of that "semi-chaotic surplus" of nerve-commotions in the centres of the brain to which the mind responds with feelings of pleasure or of pain. The pleasurable or painful character of the response depends also upon the constitution, habits, and present condition, of those centres. Strong sensations usually hurt; too vivid mental images are likely to be disagreeable; too intense thinking is not pleasant. But one may get pleasure in feeling the edge of a razor, if one do not press too hard; while too much honey may be more disagreeable than a weak solution of quinine. Even weak sensations may be intensely painful, if the nerve-centres are hyper-æsthetic, or if they are not adjusted to receive the stimulation. The slightest touch nearly crazes the "nervous" person; flickering lights, uncertain but low sounds, and indeterminate skin-sensations are intensely disagreeable to all.

Class . . .	50 boys	40 college men	38 law students	58 women	40 college women
Ages . . .	12–15	16–21	19–25	16–22	
Average . .	4.8 kilgr.	5.1 kilgr.	7.8 kilgr.	3.6 kilgr.	3.6 kilgr.

Intensity of Sensations and Intensity of Pleasure-Pain. — The relations existing between the varying amounts of the sensation-processes and the amounts of resulting pleasures or pains are not correctly expressed by Fechner's law. These relations are much too indefinite and complex to be handled by so simple a mathematical formula. In general, *the varying intensities of our pleasure-pains do not* *stand to the varying intensities of our sensations as the varying intensities of the sensations stand to the varying intensities of the stimuli.* It is no unmeaning figure of speech, when we say that a soul, with subtle and changing capacities and habits of feeling and of self-control, "stands between" the physical stimulation and the tone of feeling evoked.

Beaunis has tried to represent the dependence of pleasure-pains upon the intensity of sensations by the following scheme: —

0	10	20	30	40	50	60	70	80	90	100
Stadium of no sensation		Threshold of excitation	Stadium of indifference	Threshold of pleasure		Stadium of pleasure			Threshold of pain	Stadium of pain

The following figure (No. 10), which is adapted from Ziehen, who adapted it from Wundt, may serve to compare the results of experiment on this subject with Fechner's law. [Here **E** *min.* and **E** *max.*

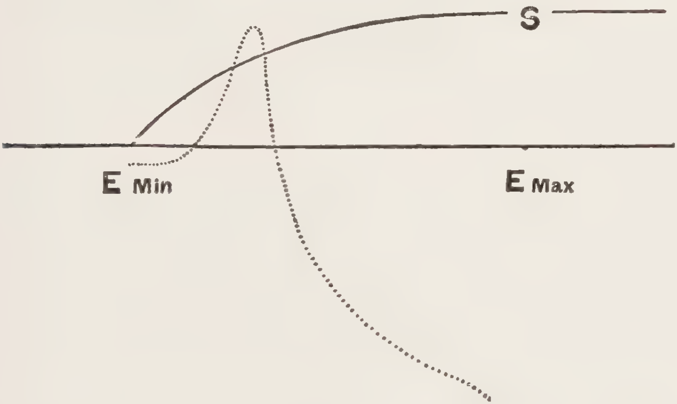

Fig. 10

represent the maximum and the minimum intensities of the stimulation. The abscissa line is the threshold, between pain, whose curve is below, and pleasure, whose curve is above. The continuous line shows the relation between intensity of sensation and intensity of stimulus. The dotted line represents the pleasure-pain series.]

Theory of "Cardinal Value." — It is an ingenious view of Wundt that the maximum amount of pleasure attached to any sensation arises where the sensation ceases to increase in simple proportion to the strength of the stimulus. This place he calls the point of "cardinal value," because it is the place where the sensation is most valuable for purposes of perception. This theory introduces the idea of final purpose into our most fundamental experiences with the pleasure-pain series. It affirms that all sensuous pleasure-pains are *relative* to the amount of cognition we get through our sensations. They somehow serve the ends of knowledge. In this connection it should be noticed how the failure of weak and unsteady sensations to help in securing the ends of perception is, in part, the explanation of the pain which accompanies them. *They provoke and yet evade the focusing upon them of attentive and discriminating consciousness.*

Kinds of Pleasure-Pains. — The use of the same words to express all forms of the agreeable and the disagreeable in our affective experience compels us at first to neglect very important differences. We have already referred to the fact that popular usage applies the word "pain" only to rather intensely disagreeable bodily sensations. Among the various senses even, the pains and pleasures are such as to suggest varying our expressions. As Lotze has remarked: "Colors and their contents merely excite satisfaction or dissatisfaction; dissonances of tones cause suffering to the hearer personally; the pleasure and pain of smell and taste are much more intensive; but it is only in the skin, which of itself alone furnishes little cognition (?), and in the interior parts, which contribute to cognition nothing whatever, that the pain assumes the character of physical suffering." That some such distinction exists, there is no doubt. But we think that Lotze has not expressed the distinction precisely.

In this connection the great differences which characterize different individuals deserve another notice. To some persons unæsthetical arrangements of color cause more disagreeable modifications of consciousness than do sharp bodily pains. And to take less striking idiosyncrasies: The ear of the Greeks scarcely tolerated the imperfect consonances of the Major and Minor Third. But Handel accepted "Fourths," and Beethoven "Fifths"; while the modern Wagnerian music is full of "jargons" of tones which its devotees claim to find delightful. The Japanese are agreeably impressed by intervals which are almost intolerable to us — partly, perhaps, because of the association of such tones with the sad and weird sounds of nature.

"Value" as applied to Pleasure-Pains. — Modern biology is fond of claiming that the hideous "bulk" of our painful skin-sensations accords with the principle of evolution. In the "ancestral worm-like" forms from which its theory would derive man, such strong reactions might have had a "beneficial tendency." Doubtful as this theory is, it suggests the same teleological view of pleasure-pain which Wundt's theory of "cardinal value" espouses. What we are interested to notice here, however, has connections which will appear later on. *Mere intensity of pleasure or pain does not seem to serve for the sole estimate of the place which the pleasure-pain series has in the development of human mental life.* Using as a standard the mere amount of pain, most men might agree with Heine: "If I had my choice between a bad conscience and a bad tooth, I should choose the former;" or with the cynical French maxim that "the chief conditions of happiness are good digestion and no conscience." But *ideal pains and pleasures are not comparable with sensuous pains and pleasures, merely as regards intensity.* In estimating these higher feelings we are guided by more complicated standards of value.

Are there So-called "Natural" Pains? — It is the tendency of all biological or physiological theories to assume that painful states of consciousness, however slightly so, are abnormal. It is difficult for them to admit that what is "bad" for the organism should be agreeable, or that what is "good" for the organism should be disagreeable. This is one of numerous instances where natural science tends to the belief that what *ought to be* so *is* so. The psychologist, however, seems compelled to admit the existence of absolutely unpleasant sensations (*i.e.*, sensations that are disagreeable without regard to their intensity or to the vital interests of the organism). Thus M. Beaunis holds that certain odors, savors, sounds, and tactual impressions, *qualitatively considered*, are normally disagreeable. The behavior of infants would seem to indicate this. The intrinsically painful character of certain feelings of relation has been already shown. Here, indeed, the principle of maladjustment to the previous condition, and so of danger to the organism, must, in general, be applicable. The way that incoming sensory processes interrupt the smooth flowing of the current of consciousness determines the pleasure-pain character of the accompanying feelings. But even this would seem to imply that some of the necessary nerve-conditions of our intellectual processes are "naturally" painful.

When we come to consider the more complex states of feeling with which ethics chiefly deals, the problem grows more complicated. Anger and revenge seem to be naturally agreeable, rather than the reverse, if the intensity of the emotions is not too great. For "weak hearts" and "tender consciences" these passions are painful. But we find vigorous Martin Luther praising the physical benefit he sometimes received from getting mad to the core of his being. The savage or the child chases his enemy in flight and thrusts him through with a spear or beats him with a stick, in a sort of ecstasy of joy. *In strong excitement of feeling of every kind, while the emotional stage endures, the normal tone is one of pleasure in the excitement.* Yet some weak excitements are normally disagreeable. And, especially, where education has developed the æsthetical attitude toward sensuous pleasures: —

> "A surfeit of the sweetest things
> The deepest loathing to the stomach brings."

Rhythm of Pleasure-Pain. — In all nerve-processes, and in the correlated conscious states, the principle of rhythm is apt to appear. The life of the nervous system cannot be maintained at a steady uniform pitch. The intermittent and recurrent character of the simplest pleasures and pains is apparent in the behavior of infants; and the complex phenomena offered by the affective experience of adults show the same principle. Connected with this characteristic is the tendency to pass quickly from one form of feeling to its opposite. "That extremes meet," says Höffding, "is nowhere better exemplified than in the life of feeling, where the sharpest and most important contrasts are indigenous." In being born, and bathed, in being subjected to all the assaults of nature upon the end-organs of sense, as well as in learning to digest its food, to use its limbs, and to express and gratify its wants, the infant is kept *oscillating* between pleasure and pain.

Feelings are not only recurrent, like all other psychic phenomena, because they occur in time-form, but they are also subject to rhythmic alterations in ways peculiar to themselves. None of our pleasure-pains remain at a perfectly uniform tension; they all have what has been called "an irregular periodicity." In not a few cases the periodicity is regular enough to constitute a rhythm.

Pleasures of Rhythm. — In connection with the rhythmic character of pleasure-pains we have to note the natural and cultivated pleasures of rhythm. Periodically recurrent agreeable sensations and ideas have their agreeable tone heightened by the feeling of their periodicity. The pains of muscular fatigue, of abraded skin, and wearied organs of sense, are often submerged in the pleasures of rhythm. Such rhythmic movements as dancing, marching, skipping, etc., are most agreeable movements. The periodic "heave-ho" of sailors as they lift anchor, the "mark-time" of the Japanese coolies under their burden of the heavy foreigner in his sedan chair, and the periodic wailing of the workmen as they drive piles or handle timbers, are instances here. The pleasures of reading and hearing poetry or music are largely of this order.

> "How sour sweet music is,
> When time is broke and no proportion kept."

Effect of Repetition. — The principle of "cumulation" is illustrated in the case of many pleasure-pain experiences. Experiment shows that the painful feeling caused by repeated accommodation, with anxiety, of the eye may grow so as to become unbearable. Small irritations experienced over and over again may throw the whole nervous and psychical mechanism into convulsive and agonizing action. But the pleasures of being gently stroked, of hearing humming bees or murmuring waters, or of being fanned with cool breezes, may be greatly enhanced by repetition of their gentle stimulations. Here, however, a number of other principles operate to modify the result. Such are the law of habit, the longing for change, the effect of monotony, the idiosyncrasies of the individual. Some persons are predisposed to find *new* sensations, ideas, perceptions, or places, unpleasant; others esteem novelty the most attractive of all characteristics of the conscious states. The former prefer the mild pleasures bred of familiarity; they are much pained at "missing" accustomed sights and sounds and tastes. They do not agree with Lamb in estimating highly the pleasures of first landing in a foreign country. "The fascinating, *monotonous* minor themes" of the West Indian strains which Gottschalk used to play should therefore please them greatly.

Diffusion of Feeling. — It is a psycho-physical principle that *every state of predominatingly pleasurable or painful emotion tends to involve the whole area of the brain, and to influence an increasing number of the outlying organs through the supreme control which this central organ has over all the bodily functions.* In proof of this principle might be instanced the extreme nausea which follows certain slightly disagreeable smells or tastes, the general depression of spirits which a multitude of very small disappointments or reverses occasions, the enlivening effect on our entire "mood" caused by repeated sniffing of aromatic flavors or stimulation of the nostrils with ammonia or eau de cologne, the convulsions of laughter into which a series of "small" jokes may throw one, etc. On the psychical side, as respects the tone of consciousness, what depths of despair or heights of contentment may mark the closing hours of a day or of a life that has been characterized by many little pains or little pleasures!

Association and Feeling. — It is difficult always to tell just what of our pleasure-pains are *primarily* connected with the sensations, feelings, or ideas, with which we find them connected, as a matter of fact, in the later developments of mental life. The influence of "association" — in the most general use of that word — upon the pleasure-pain characteristics of experience is undoubtedly enormous. Association seems to reach to the very roots of the life of feeling as we are able to study the manifestation of that life in the individual man. Doubtless it goes back to the very roots of the life of feeling in the race. This principle is especially interesting and important in its bearing upon the development of ethical, æsthetical, and religious feeling. We shall return to its consideration after we have prepared ourselves by the study of the phenomena of association.

In this way many experiences, or factors of experiences, which in other connections would remain neutral or be positively agreeable, become slightly or intensely disagreeable; and the reverse. For example, the sensations produced by contact of cool and slimy objects with the skin are usually very unpleasant. In what meaning can we call this tone of feeling "natural" to such sensations? It may be in certain cases due to painful experiences associated — either in the life of the individual or of the race — with certain objects which have this "feel." We might well say that the normal reaction of the nervous system upon certain kinds of skin-sensations is such as to produce a painful tone of feeling. Thus the fruits of ancient associations of the race have become organized, as it were, into the normal psychophysical mechanism of the individual. On the other hand, we find not a few marked exceptions to those antipathies which most infants and adults customarily exhibit. And if either insensitiveness or curiosity accounts for the fact that some children enjoy handling snails, neither of these will readily account for the fact that some adults enjoy the smell of asafœtida or of burnt feathers.

In closing this chapter it is well again to remind ourselves how rich in content, and how influential over the entire psychical domain, is the affective side of human consciousness. In subsequent chapters the cognition of things and the development of the conception of Self will be seen to be dependent upon feeling. Psychology which neglects these phenomena, or gives them relatively little attention, or treats them only so far as they can be made the subjects of psycho-physical experiment, is not fitted to become the science of the artistic, moral, religious, and social soul of man.

An historical survey of the psychology of the affective aspects and development of man's mental life would be very instructive. It is undoubtedly our feelings that are of all conscious states, at the same time most fluctuating in the individual and most fundamental in social matters. We all find our own emotional experiences subject to grave and yet sudden changes; yet it is by virtue of these experiences that we are most intimately and complexly connected, as members of a race, with its development. Until comparatively recently, psychologists gave little attention to the systematic and detailed study of human feeling. Various reasons for this relative neglect might be assigned. Rousseau, the analyst of the heart, with his keen but morbid interest in his own emotions and sentiments, did much to awaken interest in the subject. Kant's espousal of the tripartite division of the soul's faculties, in spite of continuous efforts down to the present hour to overthrow it, has resisted the attempt to return to the overestimate which was laid upon "thought" by the psychology of Descartes and his followers. And if modern experimental psychology has met with little success here, and some of its most ardent advocates have done most to disparage and restrict the psychology of the feelings, modern biological science has had the reverse influence. It has emphasized and illustrated the truth that men differ less in the possession of certain passions, emotions, and sentiments, than in the character of their ideas and thoughts. The psychological interest in various forms of art, in social studies, and in the scientific study of insane or hypnotic emotional states, has laid bare the meagreness of the current psychology. It has made forever impossible the reduction of the phenomena of feeling, either to variations of intensity in the pleasure-pain series, or to the secondary results in consciousness of the fusion and association of ideas.

[Compare, Ladd: Psychology, Descriptive and Explanatory, pp. 162–210; Höffding: Outlines of Psychology, pp. 221–307; Baldwin: Feeling and Will, pp. 89–279; Bain: The Emotions and Will, pp. 1–68. Especially valuable monographs are Marshall: Pain, Pleasure, and Æsthetics; Stanley: Evolutionary Psychology of Feeling; Beaunis: Les Sensations internes; Bouillier: Du Plaisir et de la Douleur; Külpe: Zur Theorie d. sinnlichen Gefühle.]

CHAPTER VI

CONATION AND MOVEMENT

There is obvious need of a word that shall stand for the third aspect or characteristic of all conscious states,—the aspect which is neither sensation, with its objective reference, nor feeling regarded as passive condition of being. The word "Will" does not wholly satisfy the need. For this word is surrounded with many prejudices; and willing is actually a very complex and highly developed kind of activity, whereas we are seeking a word for something simple and primary. Recent writers on psychology have chosen the word "conation" to meet this need. It may thus be said to stand for the "doing" aspect of all mental life.

Nature of Conation. — The presence of an aspect, or factor, called "the conative" must be recognized in all psychoses. To be the subject of a conscious state is to be doing something. This truth was emphasized by speaking of conscious states as "processes," or forms of the mental functioning; and, again, by showing that attentive and discriminating activity is the accompaniment of all mental life, and the indispensable condition of all mental development. Indeed, every sensation, idea, or feeling, passively considered, is a sort of challenge to the mind to act, to put forth a volition, to do something. We never know, nor feel, that we do not also strive and will. Conation enters into all perception, memory, thought, imagination. No state of suffering or of happiness is so purely passive, that it is not accepted or striven against by that spontaneity of the mind which belongs to its very nature.

Conation as Psychical Fact. — We must be content with recognition of the fact that all conscious states may, nay must, also be regarded as having in them the forthputting of the energy of the one subject of them all. This fact can only be recognized; it cannot be explained or reduced to greater simplicity. Conation — the word chosen to mark the *fact* — cannot be defined or rendered more intelligible by use of the most subtle and searching analysis. We must, however, be particularly on our guard against using this word for anything of a merely biological or physiological character. The psychologist means by conation to designate a *psychical*, not a merely physical fact. Physiology may, or may not, be justified in speaking of every amœba as having "a will of its own." The philosophy of Schopenhauer may, or may not, be justified in regarding Will as the "Ground" of the world; and theology, in regarding each man's will as the core of his personality. But psychology means by this word to designate a truth which is, primarily, neither physiological nor metaphysical, but psychological. It means to designate a primary and indubitable datum of consciousness. This datum may be expressed as follows: *All psychic life manifests itself to the subject of that life as being, in one of its fundamental aspects, his own spontaneous activity.* This fact (datum) is irreducible and beyond all dispute.

The use of the word "conation" in psychology is not without objections. Still we follow the better course in accepting it and confining its use to strictly psychological applications. As long ago as Aristotle the distinction between wholly "blind" appetencies and intelligent forthputtings of mind was recognized. Kant recognized "exertive or conative" power as involved in all psychic life. The English writer on ethics, Cudworth, in "A Treatise on Free Will," speaks of the "hegemonic of the soul" as it acquires increased control over the feelings "by conatives and endeavors." Hamilton adopted the word as covering both desire and volition. Sully says: "The most obvious common characteristic in this variety of actions or conative processes is that peculiar element which is best marked off as active consciousness." And Höffding speaks of the same thing under another term, when he declares: "We speak of volition whenever we are conscious of activity and are not merely receptive. But . . . we never are purely receptive." The common language testifies to the same experience when it speaks of "undergoing" suffering. *I undergo* the suffering — by "bracing up" against it and resisting it, or by striving to free myself from it and withdrawing attention from the painful object.

Kinds of Conation. — Strictly speaking, *there is only one sort of conation.* For this word marks the bare fact of the spontaneity of mind as entering into every phase and aspect of its own life. There are, however, an indefinite number of stages in the development of conative faculty, — all the way from blind, inchoate striving, through intelligent desire and effort after perceived or imagined ends, to deliberate and spiritual choice of the highest human ideals.

Moreover, conation is uniformly connected with two most important classes of effects. These are (1) the movements of the bodily members, and (2) the focusing and distribution of attention in the field of consciousness.

Physiological Conditions of Conation. — Even in the lowest forms of life it is not as yet possible to explain all movements as the result of irritating the peripheral parts with different forms of external stimuli. It is due to this fact that even the amœba has been said to have a "will of its own." In more complex animal structures, as the frog, for example, when the spinal cord is severed from its connection with the brain, the movements of the limbs as produced by the cord are still complicated, but are changed in character. They have lost the spontaneity, the uncertainty, and much of the variety, of the movements of the same limbs in the case of the uninjured frog. Such brainless movements are commonly said to be "reflex." If we leave the lower parts of the brain of the frog — the medulla and the optic lobes — attached to the cord, the movements of the mutilated animal become more complicated. When stroked, it will now croak with the regularity of a music-box; it will perform, in the most orthodox fashion, many remarkable feats in the coördination of its muscles. But, apparently, these movements are definite responses only to the changing quantities and places of application of the external stimulus. The movements of the full-brained frog are not thus definite, regular, and explicable as the effects of irritation from without. One can never tell whether it will leap or croak in response to a given stimulation; and if it leaps at all, one is doubtful as to the direction and amount of its movement.

This power of the central nervous masses to initiate movements which cannot be ascribed wholly to external stimulation is called "automatism." Physiological automatism is the physiological condition of the psychical fact called conation. In other words: *Automatic (or centrally initiated) nervous activity is the peculiar physiological correlate of active consciousness, of the conative element in all psychic life.* In man's case, it is apparently the automatism of the centres of the brain which furnishes the physical basis of his conscious life of volition. The proof of this conclusion, however, would take us too far into the details of physiological psychology.

Psychological Expression of Conative Consciousness. — I act and I know that I act — this as truly as I see, hear, feel pleasure or pain, and know that I have the sensations and am subject to the pleasure or pain. In the very seeing, hearing, feeling, and knowing of myself in these states, *I am active.* For psychology, active consciousness is identical with consciousness of activity. Hence the motto: "In Willing *we* work, but Wishes play *with* us." This factor of all conscious states is experienced as determining changes in the states immediately following.

In changes of the relations of bodily members, and in the flow of ideas within the so-called "stream of consciousness," there is much which appears to be done *in* and *for* us, rather than *by* us. Thus one winds one's watch almost or quite unconsciously, and one is awakened to the fact that one has been winding it by the unpleasant sensations which follow trying to keep on turning the key when the watch is wound up. The educated physical "automaton" will do a great many things for us better than we can do them for ourselves. But any turning of our attention from the train of thinking, in the conducting of which *we* have previously been active, to the character of the doings of the automaton, at once abolishes the train of thinking and profoundly alters the motor activities. The latter then become *our* doings, in a new meaning of the words. For example, one is thinking about one's money matters with a direction of conscious attention to the business in hand; one comes to the door of one's study and "automatically" takes from the pocket a bunch of keys and attempts to apply a particular key, automatically selected, to the door of the study; one awakes with surprise and confusion to find that the automaton has tried to open this door with the key of the box in a safety-deposit. *We*, then, think at once of the cause of the error and consciously select the proper key. *In general, active consciousness, with its dominant of conation, is regularly followed by modifications of sensation, feeling, and movement.*

Prior to all debate over the problem of will, as between the advocates and the opponents of determinism, is the immediate recognition of the significance of conative consciousness. Conscious activity, as tinged by the feeling of being resisted, is called "striving." As further darkened and loaded with a burden of muscular sensations, it becomes the "sense of effort." Thus our conative consciousness is, at the same time, both spontaneity of activity and consciousness of activity, and also consciousness of being resisted. This is equally true whether the striving, as regarded from the point of view of the ends aimed at, be successful or not. "Hold still," the mother or nurse says to the restless child whom she is dressing; so the surgeon to the patient writhing under pain. "I am *trying to*" is the proper reply; and it matters not whether it be added — "but I *can't*, or "and I *will*."

Feeling of Effort. — It has been customary with some writers to make the consideration of the active side of consciousness depend too exclusively on the position taken with reference to the origin and character of the "feeling of effort." The reason for this is impressive and obvious enough. If I strive with all my might to move some heavy obstacle (and I can, of course, do this only as I am resisted), I have the most indubitable and intense conviction that *I am putting forth an immense amount of energy which is, in some peculiar way, my own.* A similar impression is unavoidable when I "try very hard" to attend to the minute details of some object of perception, or to think out a complicated and difficult problem.

Here we are reminded at once that this feeling of exerting force depends in a large degree upon our actual weakness rather than upon our actual strength. Experiment shows more precisely, the same thing which common experience clearly suggests, that fatigue, soreness, and inefficiency of the external mechanism, and a variety of other sensory conditions, in general increase this feeling of effort. The men of really strong wills, in the more perfect control of strong bodies, feel the outgoing of their strength little or not at all. This experience suggests the truth that it is the consciousness of the condition of the skin, muscles, joints, breathing apparatus, and vaso-motor processes, which determines the feeling of effort. In other words, tense skin, swelling and hardened muscles, tightened tendons, jaws set and hands clenched, or other joints pressed together, the increased laborious action of the heart, and the harder breathing, etc., are what we feel when we imagine ourselves to be doing a big deed of willing.

That many important elements of the so-called "feeling of effort" are sensory and have a peripheral origin, there is no longer any doubt. Not a few writers now claim that all the elements of this impressive modification of consciousness, in which we seem to come to the fullest possible realization of ourselves as active, are purely sensory and passive. It is difficult to devise an experimental means for determining how far, if at all, this feeling is dependent upon centrally initiated and outgoing motor processes. But a careful weighing of all the evidence leads us to the following conclusions: (1) Physiologically considered, the feeling of effort is of a mixed origin. It is partly dependent upon an increased molecular activity, a "faster life," of the brain-centres which is centrally initiated; and partly upon the more intense and massive sensory processes set up in the changed condition of the periphery. (2) Psychologically considered, the feeling of effort is also a complex and mixed psychosis. It is partly dependent upon an increased consciousness of the conative sort, a profounder and more massive feeling of the Self as being alive; and, partly, upon an increase in the sensory experience which comes from things resisting the active Self.

The question whether the feeling of effort is merely a mixture of sensations of the skin, joints, muscles, etc., or is also a phase of active consciousness, due to centrally initiated and out-going motor processes of the brain, has been much debated. It is a question of no small importance. Professor James was among the first to take the view which ascribes this feeling wholly to an origin in sensation-experience. Ferrier, Münsterberg, G. E. Müller, and others, have held the same view. The opposite view, which is also our own, has been stoutly and intelligently maintained by Bain, Wundt, Beaunis, Preyer, and many more.

The reasons for holding the view adopted above are among others, the following: (1) From the earliest dawn to the latest development of mental life, it would appear that no *purely* "reflex" and no *purely* "automatic" nervous processes take place in the human brain. The two kinds of processes are ceaselessly conjoined; experiment can never wholly disentangle them. From the first, the brain is itself all alive, and yet responsive to sensory impressions coming from without. (2) Automatic activities with an outcome of movement undoubtedly take place in the brains of all the more highly organized animals. Preyer points out that even the embryonic child often moves under circumstances unfavorable to accounting for the movement as a result of sensory impulses. The crying, and kicking, and squirming, of the new-born infant seem to be, in part, the natural motor expression of its self-active nervous centres. (3) The sensory and motor elements, areas, and functions in the human brain cannot be kept apart. And to suppose that the processes which innervate the muscles have no correlate in consciousness is to go contrary to our most enlightened view of the whole field of physiological psychology. Thus much from the physiological point of view.

(4) There are various experimental proofs which favor the same conclusion as to the nature of the feeling of effort, psychologically considered: (*a*) The complex feeling of effort does not appear to run parallel in intensity with the actual movement accomplished by contracting the muscles, compressing the joints, etc. (*b*) Patients afflicted with paralysis of the periphery still have the feeling of effort in a manner to indicate that it is partially of a central origin. (*c*) The rapidity of certain minute voluntary adjustments, like those of the larynx in singing, seems to indicate that "the outgoing currents must be measured out in advance of our feeling of the effects." (*d*) Singers, with the sensitiveness of the larynx diminished or destroyed by cocaine, have still been able to sing correctly. (*e*) Baldwin's "discovery that right-handedness develops in infancy only under conditions of muscular effort" seems to favor this view. Its more obvious explanation is that a "vague consciousness of greater motor readiness," dependent upon the condition of the brain-centre, anticipates and guides the movement. (*f*) In judging the difference between movements willed and those actually executed we seem to be dependent on our estimate of the strength of the "impulse to action" rather than upon our estimate of the actual amount of movement of the active organ.

Conation and Movements. — Bodily movement and the focusing and distributing of attention are most closely related. So close is the relation that some have claimed: "Attention acts only upon muscles and through muscles." There is, indeed, reason to believe that the fixation of attention is necessarily correlated with the irritation of the so-called "striated" muscle-fibre. As attention wanders, or is voluntarily redistributed, the particular muscles or groups of muscles irritated are constantly changing. But the focusing and fixation and distribution of attention is identical with a large part (if not with the whole) of the changing life of conation. The one psycho-physical principle of the greatest importance in this connection may then be stated as follows: *All forms of sensory, emotional, and ideational excitement in the brain tend to overflow the centres and areas in which they originate, to flow down the connected motor tracts, and thus to set in movement the different parts of the motor apparatus.*

Classes of Movements. — The more elaborate classification of movements takes into account the development of all our mental life. In understanding the nature of the following classes, therefore, much that is to be explained later must be assumed. With this concession in mind we may classify all man's movements as follows: (1) *Random automatic* movements, or such as originate chiefly in mere conation ("blind will") without definite influence from any particular form of sensation, idea, or feeling. The aimlessly squirming bodily mass of the new-born infant is a type of such movements. (2) *Sensory-motor* movements are those whose chief psychical excitant consists in some form of sensation. The child reaching its hand toward the light of the candle, or kicking when it feels the pin-prick, illustrates this class. But such movements may be called (3) *Æsthetico-motor*, if, as usually happens, they are responsive to the excitement of feelings with a positive tone of either pleasure or pain. Where conation excites and determines movement, but without intelligent or deliberate seeking of an end, we may speak of (4) *Impulsive movements.* But whenever the sensations, feelings, and resulting movements are related to an end connected with the preservation and propagation of the species, we call the movements (5) *Instinctive.* Such movements as emphasize the realization of some idea present in consciousness may then be called (6) *Ideo-motor.* A combination of the first three forms of excitement may result in complex and expressive coördinations of the muscles that are directed, not by any conscious idea, but according to a pattern set by some adult of the same species. These are commonly spoken of as (7) *Imitative movements.* In infants of a certain stage of development, smile answers in imitation of smile, frown of frown, grimace of grimace, etc. To the general principle of suggestion, as involved in such movements, we shall have need to recur again.

That "*every state of consciousness tends to realize itself in an appropriate muscular movement*" has been called a law of "mental dynamogenesis" by Féré, Baldwin, and others. This law is illustrated in the case of each of the classes of movements mentioned above. The human animal is not made to keep still; the human animal cannot keep still. Not to move in any manner, or in the slightest degree, is to undergo a temporary death. The embryo moves in the womb; the sleeping child rolls "aimlessly hither and thither when fast asleep." Every smell is a challenge to sniff the air into, or blow it out from, the nasal passages. Every taste provokes the tongue to try the substance by rolling it about. Strong pain throws men into convulsions; they leap and dance with intense rage or joy. In the insane asylum the patients afflicted with "depression of spirits" move slowly, or sink their heads upon their breast, let arms and legs lie flabby, or fall "all in a heap."

The fainter feelings and sensations provoke us to the movements which are necessary to define them more closely. Every vivid idea of doing anything produces a state of tension in the muscles needed for doing that thing; if it does not also throw them into a state of actual and obvious movement. The "ideo-motor" kinds of movement are innumerable; they are the movements which record the influences of suggestion in the dreamer, in the hypnotic subject, and in the waking activities of daily life. Tell the person in a state of hypnosis that he is drinking ink instead of water and he begins to gag and spew appropriately. But if he has the "idea" that he is drinking lemonade instead of vinegar, he smacks his lips accordingly. The child gets control of its own muscles under influence from the same principle. Preyer affirms that he noticed a child of only fifteen weeks "making attempts to purse the lips when I did it close in front of him." We all tend to smile at others smiling; and sounds of weeping, or of that "woe" to which Thackeray makes reference in his Essay on Crossing the English Channel, are apt to elicit similar motor reactions in us.

Development of Motor Consciousness. — Certain psychophysical principles furnish conditions to the growth of the mind's experience as connected with the control of the bodily organism. The following three may be noted here: (1) The principle of interference. Certain muscles and coördinated groups of muscles cannot be moved simultaneously. When the sensations, feelings, or ideas, which tend to set such muscles into action occur in rapid succession or in confused conflict within the same field of consciousness, they inhibit each other. We may feel like laughing *or* crying; we do not know which. But we must actually laugh and cry *by turns.*

(2) The principle of fatigue causes the cessation of movements when they have been long continued or executed with a high degree of energy. It also operates to select those which are to get the "upper hand" in the struggle for existence. In general, we prefer to move in the easier of two possible directions.

(3) The principle of habit prevails in the entire realm of bodily movements.

Importance of the Life of Movement. — His mental development and all the well-being of man is dependent upon the control of the muscles of the body, in a very fundamental and important way. If man were not a moving organism, expressive of and obedient to his own conative consciousness, he could never arrive at a knowledge of things or attain a condition of mastery over them. We shall see later on that it is no more possible to explain perception by the senses without taking into account a *moving* eye and a *moving* hand, and, indeed, an entire equipment of *movable* organs, than it is to explain the same development as the result of impressions upon a passive *tabula rasa*. It is when we *will* the occurrence of changes in the parts of our own bodies, and through their movements effect changes in things, that we learn both to know our own bodies and things external to our bodies. The training of the life of bodily movements is, then, a most important part of education.

[The more advanced student of this subject should inform himself as to the phenomena of automatic reaction and reaction-time. See Ladd's Elements of Physiological Psychology, Part I, chaps. iv and vii, and Part II, chaps. i, ii, ix, and x. For the general phenomena of conation compare the Psychologies of James (II, xxvi), Höffding (vii, A and B), and Baldwin (II, xii–xv). Important monographs are the following: Spitta: Die Willensbestimmungen; Mach: Grundlinien d. Lehre von d. Bewegungsempfindungen; Münsterberg: Die Willenshandlung.]

CHAPTER VII

IDEATION

Unless the later conscious states could, in some sort, "represent" or stand for the earlier, there could be no continuity or development to the mental life. A *stream* of consciousness cannot be a flow of disconnected and independent psychoses. The effects of previous experiences inevitably show themselves in every new experience — however original such experience may seem to be. Without memory of my own I have no past for myself; and I can have no past for any one else unless it be in the memory of this other one. But memory is correctly spoken of as *representative* faculty, *par excellence*. Neither in the wildest play of fancy, in dreams, in the vagaries of the hypnotized and of the insane, nor in the most purely creative imagination of the originator in art, invention, or speculative thought, can mental life get on without making use of "stuff" derived from its previous conscious states.

The elementary and universal mental process involved in all work or play of representative faculty is called "Ideation." And for lack of a better term we shall speak of the products of this process as "mental images" or "ideas."

Nature of the Representative Image or Idea. — What are the principal characteristics of this elementary representative process, and so what is the nature of the mental image or idea, can be best understood by carefully attending to the events in consciousness immediately after the stimulus is withdrawn from any organ of sense. Let the question now be asked: How is the experience modified in character on the attempt being made to call it back? Plainly, it is not the *sensation* itself, or the *perception* itself, which is called back. It is a much modified mental process which answers this call. Instead of the sensation we have in consciousness the *idea of* the sensation; instead of the perceived object, we have the *image of* the object.

Here, as elsewhere, the popular (and even the so-called vulgar) use of words is most true to life, because fresh from a living experience. The usage of the people does not hesitate to say: "I have no idea how that rose smelled;" or, "I cannot get rid of the idea of that nasty-tasting beef." In such usage the word idea stands for a mental process which may be regarded as more or less faithfully reproducing some form of actual experience. When the complaint is made, "I have no idea" of the soul, or of God, this means that these objects are not representable in satisfactory terms of previous experiences.

An entirely fit word for the elementary representative process, regarded as a psychical product, will probably not be found. In Latin the noun *imago* might be applied to a "mask," an "apparition," a "ghost," or a "phantom." In all these cases it meant something which is recognizably *like*, but *really is not*, something else. This meaning adapts it admirably to several important aspects of the representative process. Yet the word "image" is most obviously fitted to express our experience with the eyes. We *see* images; but to speak of images of smell, taste, muscular, tactual, and joint sensations, seems inappropriate. It sounds odd also to refer to the image of the symphony heard last night.

Similar objections may be made to the word "idea," which is from a Greek word nearly equivalent to the Latin word *species*. These objections have to yield, however, to the psychologist's demand for some term which shall express the elementary process and product of *re*presentation — the bringing up in consciousness again of what has, *in some sort*, been there before. And the excellent suggestiveness of such derivatives as "ideation," "ideate," etc., is an additional advantage coming from the use of the word "idea."

After-Images. — In studying the nature of the idea and of the process of ideation, it is well to begin with the phenomena of "after-images." The sensations of all the different senses show substantially the same phenomena; but in the sense of sight they are more obvious and more successfully studied. For example, let one look fixedly at a candle or at a brightly colored spot, and then note what follows on closing the eyes. The immediate impression, which lingers an instant, will so closely resemble a sensation as respects intensity, life-likeness, and objective reference, that it seems more properly called an "after-*sensation*." It is indeed due to the lingering effect of the external stimulation.

On making the above experiment, the strongly sensuous after-image soon begins to waver, to intermit, and finally disappears. It is then difficult or impossible to force the revival of anything *exactly like* it. Suppose, now, that we try to reproduce a concrete conscious state as *nearly like* this former sensuous experience as possible, but without receiving again the external stimulus. According to our excellence of power as "visualizers," the result will be a more or less successful *re*presentation of the previous experience. This may be called a "memory image of first intention." It must not be confounded either with the after-sensation or with the conception of — the "thought about" — a candle, a bright spot.

Fading of the Memory-Image. — The effect of time on the character of the representative image or idea may be investigated experimentally. The memories of the greater part of our sensations, feelings, and volitions quickly pass away, perhaps never to return. But, as we shall see later, they all leave some sort of impress on the character of the stream of consciousness. For example, let one be aroused from an absorbing occupation to tell what trivial event has just fallen under his eye or happened within his ear-shot, and if the question be asked not more than 2 sec. to 10 sec. after the event, it may be answered correctly. But if the memory-image has been fading for a longer time than this, it will probably be gone beyond recall.

Weber found that the primary image of weight sank so rapidly as to be almost gone in 10 sec.; and Lehmann found that a shade of gray could be recognized with certainty only so long as the interval did not exceed 60 sec. In testing his memory for "nonsense-syllables" another observer (Ebbinghaus) decided that after one hour half the original amount of work must be done in order to relearn a series, once learned before; after eight hours relearning required two-thirds of the original work. From these experiments this observer attempted to derive a law for the fading of the memory-image: "The ratio of what is forgotten to what is retained is inversely as the logarithm of the time."

On the other hand, the intensity and life-likeness of certain memory-images persist in consciousness to a remarkable degree, for an indefinite time. Dr. Moos tells of a patient whose acoustic images persisted with the vividness of sensations fifteen days after a musical *séance*. M. Baillarger, after working on brain preparations with a fine gauze over them, would for a long time see the image of the gauze covering other objects in the field of perception. Another worker in science, when walking the streets of Paris, frequently saw the images of the objects he had been working with, projected upon surrounding things.

Revival of the Memory-Image. — The laws of the revival of the memory-image are closely connected with the laws of its fading. Both are related to the psychology of voluntary recollection. In general we may say that the accuracy and certainty or definiteness of the revival of our representative images vary inversely as the amount of their fading. This subject admits of a certain degree of experimental determination. For example, suppose that one moves the arm through a definite space, and then, after a given time (10 sec.), tries to guide one's self by the memory-image of the muscular sensations so as to move the arm through exactly the same space. Repeated experiment shows two results: (1) the idea of the distance has changed; perhaps it will be made, on the average, only nine-tenths as much as it should be. But (2) the idea of the distance has become fluctuating and uncertain; the results vary considerably when compared among themselves. By carrying out the same method of experiment with longer intervals (20 sec., a minute, etc.), the relations between the decreasing accuracy and definiteness of the revival, on the one hand, and the increased fading of the mental image through lapse of time, on the other hand, may be investigated.

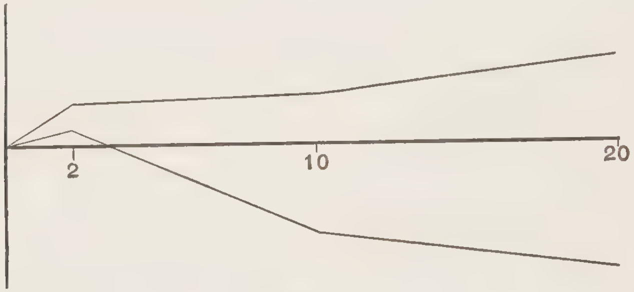

Fig. 11

The accompanying diagram (No. 11), constructed by Dr. Scripture on the basis of experiments in the Yale laboratory, shows that the increase in inaccuracy and the increase in indefiniteness follow different courses. Thus the horizontal line marks the interval of time up to 20 sec.; the line that first rises and then falls shows how the standard distance was first overestimated and then increasingly underestimated; and the line that rises constantly shows how the amount of indefiniteness constantly increased.

Apparently the changes in the accuracy of the revival of the memory-images of sense are a more individual affair and vary with different persons, and the changes in indefiniteness or uncertainty are more fixed and belong to all cases.

Physiological Conditions of Ideation. — The most fundamental laws of all living structure furnish the physiological conditions of the representative process in the mental life of man. These laws have to do with the metabolism, cell-propagation, nutrition, and growth of the nervous system; and especially of the brain. There is, indeed, a mischievous fallacy, against which we shall enter our protest in discussing the nature of recollection, lurking in the phrase "organic memory." But there is also a most important and indubitable truth emphasized by this phrase. Every human brain has a history which is, figuratively speaking, written on it in characters of the impressions it has received and the uses to which it has been put. This history is formed under the principles of habit, growth, and tendency. What it has done, in the way of past reactions to external and internal stimuli, has grown into its very structure; this characteristic growth is the embodiment of its habits and the dictation of its tendencies. It may be still plastic. Indeed, to lose all plasticity would be to cease to live as a brain; but its habitual ways of behavior in the past give ever-increasingly strong conditions to its plasticity.

"Inorganic tendencies" of a molecular kind are familiar enough to physics as existing in all kinds of bodies. Even a good old Cremona violin "stores" in its structure, as a sort of inorganic memory, certain molecular alterations of its woody fibre. The practice of modern photography depends upon the fact that a plate of dry collodion, or other preparation, when exposed for an instant to rays of light, retains afterwards the effects of the changes thus produced in its minute particles. But these tendencies only faintly foreshadow those of which we find organic bodies capable. Every cell is an aggregate of particles which, in their chemical constitution, arrangements, and habits of reaction, retains its own past experience as a cell. And the cells propagated from it receive (or "inherit") its subtle and invisible tendencies.

But especially is the nervous system, and above all the human brain, a storehouse of tendencies, or "dynamical associations," dependent upon the previous history of all its elements in their manifold relations to each other. These elements, having acted together in a certain way, tend to act together in a similar way. In every portion "the whole curve slumbers." Now we know by experimental and other evidence, to which reference will be made later on, that the cortical centres concerned in sensation and in ideation are the same for the same objects. Hence is derived, as from our entire conception of the nature of the nervous mechanism, this principle: *The mechanism of representative images, as they occur and recur in connection with each other, has its physiological conditions in certain "dynamical associations" amongst the nervous elements of the brain-centres.*

Variable Characteristics of Ideas (Mental Images). — The different representative images differ among themselves in several important ways. Of these characteristic differences the more important may be summed up under three heads: (1) Intensity, (2) life-likeness, or "fulness of content," and (3) objectivity. By the first of these three characteristics is understood the sensuous vivacity of the idea; its pungency, so to speak, or ability to take command of the attention and force a focusing of attention upon itself. By the life-likeness of an idea is understood its ability to represent the original in all the concrete particulars which belong to that original. Life-like ideas are more content-full, less meagre and "schematic," than are those that lack life. By the objectivity of an idea is meant the amount of conscious reference which it carries, so to speak, to some actual experience, either with things or with ourselves, as furnishing the real basis of the process of representation. Thus we speak of *ideas of* real objects as distinguished from *mere* ideas. The distinction is, indeed, one of degrees — of amounts of objectivity. And it is the tone of feeling which fuses with the idea that largely determines the objectivity of any idea.

These three characteristics of ideas — intensity, life-likeness, objectivity — are closely related in every elaborate representative process. Ideas of very simple sensations, or of bodily feelings, by mere increase of intensity become objective, and so indistinguishable from sensations. But in the case of complex objects of perception or of self-consciousness, it is the amount of content which largely determines their likeness to life. A vivid idea of the cut of a knife may become a localized bodily pain as if one were being really cut with a knife. But an idea of a dead or absent friend would have to possess something more than mere vividness to seem *like* that friend; it would have to possess richness of content.

Intensity of Ideas. — Some distinguished psychologists have denied that ideas have intensity. Others have made their chief or only point of difference from sensations and perceptions a "fainter" degree of intensity. Both opinions are clearly wrong.

Thus Lotze maintains that "the idea of the brightest radiance does not shine, that of the intensest noise does not sound, that of the greatest torture produces no pain," etc. And Ziehen declares: "The ideas of the slightest rustling and of the loudest thunder exhibit no difference in intensity whatever." These sentences involve a curious and even absurd misapprehension. From the psychologist's point of view we might as well say that the *sensation* of brightness does not shine, etc. Surely the sensation "*of* green" is not to be called a *green* sensation, any more than the idea "*of* blue" is to be called a *blue* idea. But surely also the idea of the *bright* sun, if it is truly a "representative" idea, differs intensively from the idea of *faintest* dawn — differs, that is, in some way which stands for a difference in amount of light-qualification, — in the intensity of psychic energy corresponding to the idea.

The misapprehension just noticed may be corrected by calling attention to the important distinction between "thinking about" things and "calling up ideas" of things. I may think about whispers and thunder, and about sun and candle, without being conscious of any even faintly sounding image of whisper or of thunder, or faintly glowing image of sun or of candle. But even this absence of intensive qualification will usually be found to involve the fact that the actual representative content of consciousness does not, in such a case, consist of similar acoustic or visual images at all. In such cases the actual stream of consciousness is probably a train of thought supported by a succession of words.

Certainly it is not every one that can visualize the idea of the sun so intensely as actually to see its disk in a dark prison, as Benvenuto Cellini did. Nor can every one rival the English painter who could paint a portrait from the mental image of the subject placed before his "mind's eye" in a real chair. But every one's experience in ideation is governed by the same two general principles: (1) Similar activities of the organism are called out, though usually in a fainter degree, by the original sensation or perception, and by the representative process for that particular sensation or perception. (2) Although different individuals differ widely in respect of their representative processes, and these processes differ greatly among themselves, they all have some degree of intensity. This *is* the intensity qualification of the idea or mental image, produced. The idea of a person in torture, when the idea is intense, is itself a fainter torture. This is especially true in the case of highly sensitive and imaginative persons, like Balzac, who could produce, in his own body, the sharpest pain of being cut with a knife by imagining himself cut.

In this connection it is pertinent to refer again to (see p. 121 f.) the "dynamogenetic value" of ideas. Other considerations being disregarded, ideas *move* the soul and the body in accordance with their varying degrees of intensity. With the requisite intensity they may have all the influence, even over the grosser bodily organs, which sensations and perceptions have. Starting from any particular sensation we may trace its fading into the more ideal form of the primary, and then of the secondary, mental image. Starting from the most "ideal" of mental states we may so increase its intensity and life-likeness as to get from it all the effects of sensation and sense-perception. In dreams our mental imagery often takes its rise from misinterpreted sensations. But this mental imagery is in turn productive of the appropriate sensations and movements. Thus the dreamer who imagined that a stake was being driven through his foot by burglars, in order to account for the sensation of a feather between his toes, saw the burglars, felt their tortures, and struggled with them, as clearly and as mightily as though his perceptions had been "real."

Life-likeness of Ideas. — Strictly speaking, we rarely or never have an idea of a simple sensation or feeling or volition, as such. Hence Dr. Ward is probably right in the opinion that a simple visual or tactual experience (redness or softness) cannot be reproduced in imagination. We ideate perceptions and not unlocalized sensations or abstract and disconnected movements; we have representative images of things seen or felt. For this reason the ideas of things differ from the things as perceived, in other respects than in mere intensity of the process of presentation. *Re*presentative images are not experienced as *merely* fainter copies of the original experiences. One most important difference between the two is that things perceived have a rich and full content, but ideas of things are comparatively poor and meagre in content. And if we try to render the content of our ideas richer and fuller, we have to take time and call up their different features one after the other. How different this poverty and fluctuating character of detail from that immediately present wealth of detail with which the eye, and even the hand and the ear, give us their objects! If the objects to be ideated are our own experiences, the case is not greatly different. We can *live through*, in five minutes, more than it takes us almost as many hours to reproduce in a succession of memory-images. *The "life-likeness" of the idea is therefore dependent upon its possessing a richness of content corresponding to its original; and that idea is the most "lifelike" representative of any experience which most nearly reproduces the complex characteristics of its original.*

Objectivity of Ideas. — Different ideas differ greatly in the claim which they enforce upon the mind to refer them to the world of real existences. Some ideas surely represent actual occurrences; others, equally surely, must be regarded as mere products of fancy. Still others we are in doubt about; one cannot always tell whether one remembers or imagines some particular thing. There are also ideas which represent entities that no eye has ever seen, or hand handled, but about the reality — the objective reference — of which, there may be little or no doubt. Such, for the chemist, are his ideas of atoms and chemical forces; such, for the biologist, is his theory of evolution, or the history of the changes that have gone on in some embryo which has become visible only when it has arrived at full development.

The considerations which influence the mind in making this "objective reference" for some ideas, and denying it to other ideas, are so many and are so much a matter of the entire mental development, that we shall be obliged for the present to postpone our treatment of them.

The "Idea of a Feeling." — Popular usage would seem to compel the belief that it is possible to ideate our different forms of feeling. For do not people commonly say: "I had no *idea* you felt as you do;" or, "Can you *conceive* of any one feeling in such a way?" But what sort of a psychosis can the "idea of a feeling" possibly be? It has been said that the essential nature of feeling is in its being felt; feeling would, therefore, seem to be not representable in terms of the idea. A little attention to the actual experience in such cases, however, helps us to clear up this seeming paradox. Such attention needs direction to three important truths: (1) No conscious state is a state of *mere* feeling. There is no original experience to come up for reproduction, which has been an experience of mere feeling. (2) The representative idea is itself always a complex conscious process, partly like and partly unlike some original conscious process. (3) The so-called idea of any past feeling always has an accompaniment of feeling similar to the original feeling.

What happens, then, when we remember or imagine (have an "idea of") some particular affective experience is this: the perceptions, thoughts, reasonings, actions, etc., which constituted the original intellectual aspects of the experience are ideated, and a similar excitement of feeling accompanies the ideating process. Strictly speaking, then, *The "idea of a feeling" consists of the representative image of the original sensational and intellectual accompaniment or cause of the feeling, suffused with a revival — usually in fainter degree — of an affective condition similar to the original feeling.*

For example, we cannot have the idea of "how-it-hurt" us to have that particular tooth pulled, without picturing to ourselves the tooth as localized by sensations of touch, — and probably also many of the external details (dentist with forceps in hand, chair, etc.), — and then feeling over again a much fainter but similarly localized pain. We can "think about," how we had that particular tooth out, etc., and perhaps escape any revived idea of how we felt. But the idea of the feeling can be recalled only by an accompaniment of revived similar feeling. *Only emotion can represent past emotion.*

The Process of Ideation. — Not only is it true that our representative consciousness is not confined to the so-called idea of a simple sensation, but it is also true that ideas do not occur singly in consciousness. Representative images obviously have a certain complexity which may be figuratively spoken of as the result of a "fusion"; they ordinarily occur also in trains, or successions, of greater or smaller extension. This means that the complex process of ideation continues in the stream of consciousness; and that those successive parts of it which discriminating attention can grasp together as ideation-states are dependently connected together. Once started, we keep on ideating for at least a fraction of a minute. *The process of ideation is essentially a succession of ideas.*

Two general truths, which apply to the entire mental life, must be appealed to in every attempt to account for the continuous and connected process of ideation. These are the following: (1) *The circuit of every field of consciousness is made by the very nature of mental life a limited affair.* Not more than so many ideas, nor more than so much complexity of any one idea, can come within the grasp of one consciousness, even in the best estate of human psychical energy. (2) *All the partial ideation-processes have a modifying influence upon each other in the formation of the complex and continuous process of ideation.* The principle of relativity, in an active and effective manner, applies to all the objects in any one field of consciousness, to all the factors in any one mental state.

It follows from the two foregoing principles that every representative state of consciousness may be regarded as a sort of "resultant" which includes a number of partial processes of ideation, whose total character is determined by the reciprocal influence of these same partial processes.

We much prefer this way of regarding ideation as a conscious process resulting, under the laws of mental life, from the reaction upon each other of a variety of simpler and more primary processes, to any theories like those of Herbart or of the English Associational School. The followers of the former are much too apt to speak of ideas as though they were entities which admit of being treated as "examples" in addition, subtraction, and even in terms of the higher mathematics. The latter too often appear to regard the explanation of the entire mental life, and of its development, as capable of being brought under the so-called "laws of the association of ideas." Mr. Spencer's views on the "chemistry of ideas" quite regularly seem to include both these fallacies. The truth of Herbart's view, and of the view of the English Associational School, is preserved if we regard the conditions under which, and the manner in which, the simpler and partial processes of ideation combine and succeed each other, to facilitate the development of mental life. But the development of that life includes activities far other and higher than those provided for in terms of association. Nor is association itself ever merely passive. For in representation, *the total character of every psychosis is the result of a spontaneous selective process, under the laws of that unity of consciousness which the very terms "state" or "field" of consciousness signify.*

Spontaneity of Ideas. — By the phrase "spontaneity of ideas," we mean to teach, in a figurative way, this important truth: *Every ideation-process tends to recur in consciousness, if no other interests prevent; and the strength of this tendency depends upon a variety of considerations which may be investigated.* "Suggestion" of one idea by another is scarcely, then, to be spoken of as the primary thing. Intense, lifelike ideas, that stand for realities in which we have an absorbing interest, especially when they have been frequently and recently repeated, tend strongly to recur in the stream of consciousness. They do not need to be suggested. They arise, delightfully or frightfully fresh and strong, and dominating attention in a way to emphasize their own vitality. They keep recurring, "of themselves." Such experiences seem better accounted for by a theory of the spontaneity of ideation processes, under the two general laws of mental life given above (p. 136), than by any theories of "suggestion" or "association," properly so-called.

Thus the idea of his mistress perpetually recurs in the lover's mind; the idea of the sick child in the mind of the mother; the idea of the departed friend in the mind of the survivor. Thus, in times of commercial panic, bankers and merchants cannot keep out of their minds the idea of business; in times of political or religious excitement it seems as though ideas of the appropriate kind were impregnating the very air. At other times mere random excitement of brain and mind seems to render all manner of rubbishing ideas endowed with a supernatural spontaneity. The ideation-processes "go wild." The successive fields of consciousness seem to be filled full of a hurly-burly of conflicting ideas that, without suggestion or reason, have "of themselves" broken forth to struggle or to sport together in the stream of consciousness.

Fusion of Ideas. — The claim has already been established that the more complex and continuous processes of ideation must be explained by the relative interaction of numerous simpler, partial processes. This result may be considered under the term, the "fusion of ideas." Fusion takes place whenever a number of mental images — either (1) homogeneous (like) or (2) heterogeneous (unlike) — have become so connected together as to be simultaneously reproduced in the unity of one field of consciousness. Examples of homogeneous fusion occur in the case of all complex perceptions by any one of our senses. Thus the idea of an extended visual body implies a "solidification" into a mental unity of several representative processes that have their origin in sensations of color and light, and in muscular and tactual sensations. The idea of an extended tangible body is a fusion of ideas of temperature and pressure sensations.

Heterogeneous mental images become fused so as to recur in the most whimsical and unnatural combinations in the unity of a single reproductive process. Thus one learned man, who had committed to memory certain passages from books which he read while running errands, could never afterward recall the contents of these books without their being accompanied by the flitting images of the palisades and hedges by which he had run while reading. Another, who had worked as apprentice for a hatter, could never see black wainscoting (like that of his workshop) without at the same time smelling the varnish used in his former trade. The learned Maimon always accompanied strenuous mental effort with the same "Talmudic intoning and movement of the body" with which he had mastered the writings of the synagogue. All mental life thus has its nonsensical side.

To speak of such close and inseparable connection of partial processes of ideation as a "suggestion of ideas," seems to us no more appropriate than it would be to say that sensations of temperature "suggest" those of pressure, or the reverse, when I perceive with my hand the coolness and smoothness of a marble slab. In this case, sensations of temperature and of pressure fuse in that complex conscious state which, as involving other mental operations to be dealt with subsequently, we call the perception of something "cool-and-smooth." When, then, the complex idea of such an object recurs in consciousness, the word "fusion" seems still the most appropriate term to express the resultant of the several partial ideation-processes. In neither case, however, is this word to be understood in such manner as to impair the unity of the conscious state. Undoubtedly a similar principle extends far on into the higher developments of mental life. When, for example, the child cries because his mother *suggests* sending for the doctor, the term "suggests" serves well enough to point out the relation which exists between hearing the word and the complex memory-image that arises in the child's mind. But why should we adopt the clumsy expedient of saying that the word doctor suggests saddlebags, and saddlebags suggests medicine, and medicine suggests nasty tastes; and so on? The child's very *idea of the doctor* is just this fused complex reproductive process, answering to the terms — a nasty-tasting — medicine-man — with — saddlebags.

Conflict of Ideas. — The process of ideation does not always, by any means, run smoothly forward. We are sometimes made painfully aware of this fact. It seems as though we could not *realize* the right and satisfactory process, because the tendencies to form partial processes which will not come together in the unity of a conscious state are so strongly felt. This experience of our ideating activity, with its characteristic tone of feeling, may be spoken of as a "struggle" or "conflict" of ideas. It is scarcely necessary in this connection to utter again the warning against regarding the ideas as entities that can "inhibit," "conflict with," and "overcome" or "destroy" each other. But we have here a frequent experience, which needs to be recognized and, if possible, accounted for. Nor is the account difficult to give. As experience becomes more complex, there is no single process of ideation which has not occurred, in slightly modified form, in connection with a considerable variety of particular experiences. Thus the particular tendencies to fusion, and the corresponding suggestions of every process of ideation, are numerous, not to say innumerable. But the principles which limit the total stream of consciousness, as well as each particular portion of that stream, do not permit all these tendencies to prevail. Moreover, if the complex idea which is to occupy the central part of any field of consciousness is a memory picture, it must resemble its original. Even in the indulgence of the wildest fancy, the result of the ideation process must be somewhat like what is real in fact. Definite forms of fusion, to the exclusion of others, must then prevail; particular ideas must be suggested, to the partial or total suppression of all others.

We may get a lively experience in the "reciprocal limitation of ideas" by trying to visualize red while repeating the word blue ; or to sing *c*♯ while intently looking at the note *b*♭; or to picture the memory of Mrs. X.'s face with some one feature modified to the recollection of the equally familiar face of Mrs. Y. Both the principles of the "fusion" and of the "inhibition," or "conflict," of ideas are provided for in the following statement: *Every ideating process (or idea) expresses a number of tendencies to reproductive energy that are "solidified" for the time being under the limiting and yet unifying conditions of that particular field of consciousness.*

Dependent Connection of Separate Ideas. — It is, in fact, our *conscious states*, and not our simple or complex ideas alone, which follow each other in the stream of consciousness. But conscious states are always something more than mere processes of ideation; they are states of knowledge, feeling, will, — all three in each conscious state.

The succession of these states in time involves — or rather, it *is* — the entire knowable being and history of our mental life.

Ideating processes are, however, a most important part of the life of the mind; and the laws of their connection and sequence (the laws of "suggestion" or "association" of ideas) are of the greatest interest to the psychologist. In studying these laws two truths are of value in a preliminary way: (1) The succession of ideas is relatively "free." *We* cannot directly determine by mental habit, or temporary mood, or sudden feeling, or choice, what the succession of perceptions shall be. But the succession of our own ideas is obviously, to a much larger extent, a *matter of our own choice* or state of mind. This is true, in a limited way, of memory; but it is, above all, in fancy, that we are free. (2) Observation and experiment show that the succession of ideas is not free in the sense that sequent ideas are not dependent, both for their occurring and for their character, upon preceding ideas. The succession of ideas is limited and determined by something other than merely our feeling or our choice. If the idea **A** occurs in consciousness, it is not an even thing whether **B** or **N** will follow; neither is the appearance of **M** without the expectation, not to say certainty, that **N** will appear next rather than **B**.

One fact of experience which expresses the truth of the second statement just made, while leaving room for the undoubted truth of the first statement, is the following: *Not only single impressions, but successions of impressions, tend to be reproduced in a manner similar to the original impressions; and the reproduction of the time-order is a result of the general disposition to reproduce.*

Association of Ideas in Series. — The simplest cases of association best illustrate the foregoing principle of all association of ideas. Such cases are frequent enough, and they lie at the very base of early education, since all primary training and development of mental faculty requires the repeated production of similar psychical processes in similar sequence of time. It is thus that children learn to walk, to talk, to sing, and to use their senses in the perception of things, and their powers of memory, imagination, and thought. In the same way every adult masters the mere routine of his past impressions, and stores them for future usefulness. Mention any particular letter in the alphabet, and the succession of letters follows in idea, in the original order of learning the alphabet. *A* suggests *B*, *C*, *D*, and *L* suggests *M*, *N*, *O*, *P*. The first tones of "Old Hundred," or of any other familiar hymn, draw the succeeding tones almost irresistibly after them. To sing it backward is well-nigh impossible, although this particular tune is about as good music when sung in reverse order as in the order which became *fixed* when it was learned.

But the association between members of a series well learned in a certain order gives a preference, so to speak, to more or less distantly connected members of the same series. This preference is, of course, strongest in the original order; but, within narrower limits, it may even acquire force in another than the original order. Ebbinghaus found that, in learning series of non-sense syllables, even the not *immediately* contiguous members of the series had become associated. A series once learned and then forgotten could be relearned with a saving of 33.3 per cent. of effort for the next contiguous members. But on skipping one syllable, the saving was still 10.8 per cent.; and on skipping two, three, or even four syllables, the saving was still 7.0, 5.8, and 3.3 per cent., respectively.

Condensation of Series of Ideas. — In its intense practical efforts to secure its ends, the mind is not content to abide by the slower process of reproducing series of ideas in their original order. The grasp of consciousness is necessarily limited; hence the necessity of condensing the series of ideating processes by dropping out unimportant members of it as originally required. This process of condensation is preparatory to the formation of conceptions and to the use of words as the "bearers" or "vehicles" of the condensed series of ideas. Thus *A*, *B*, *C*, comes to stand for the entire alphabet. "From A to Ω" may do well enough for all that lies between, if only a vague feeling of some content intervenes. In this way we form the idea of a familiar stretch of scenery, of a journey we have taken, of a long passage from some favorite author, or of an entire musical aria. The scenery contained these three or four notable memory-pictures; the journey was that one from New York to London when the two days of rough weather occurred; the passage is the one beginning thus and ending so; the aria has such snatches of melody, which we repeat in idea. Modern Japanese has one word compounded out of the first syllables of the three principal cities (Kyoto, Osaka, and Tokyo) of Japan.

Very important in this connection is it to emphasize again the nature of the grasp of consciousness. Thus Cattell found that three times as many letters, when connected into words as when disconnected, could be apprehended in one field of consciousness. And Ebbinghaus found that one-tenth as much work would suffice to learn the same number of syllables when making sense (capable of being ideated in condensed form) as was needed for mere non-sense syllables. A close watch upon ourselves will disclose the truth that, even when we are listening most intently and, as we say, "taking in every word," we really form only a very limited number of ideas to stand for the entire series of experiences. We conclude then: *Some of the members of any series come to stand as repre-*

sentative ideas, not only for their own originals, but also for several of the contiguous members of the original series; and the subordinate members of the series take the part of faint (somewhat parasitical) "fringes" of ideation for the emphasized ideas.

Principle of Contiguity. — The one principle under which all cases of association of ideas fall may now be announced. It has been implied in all that has already been said about the process of ideation; and, indeed, about the fundamental nature of mental life. It may be called "the Principle of Contiguity," and may be stated in the following way: *Associated ideas reappear as contiguous states of consciousness (are associated) because they represent processes that were, with varying degrees of intensity and in other forms of relationship, originally contiguous processes.*

The *psychical* character of this "contiguity" which furnishes the basis of association in idea cannot be overemphasized. The time or space or other relations in which the original experiences were connected, are not to be conceived of as something apart from the activities of the mind itself. That events actually occur together in the external world affords no reason for their being associated together in idea, unless they are *perceived* or *thought* as occurring together. That things and events are really similar or contrasted does not furnish an explanation of their association in idea, unless they are *perceived* or *thought of* as similar or contrasted. In brief, it is contiguity in consciousness, the actual being together in the unity of the mental life, which accounts for the ideas recurring together as associated ideas in that same mental life.

Application of the Principle of Contiguity. — The validity of this principle as applicable to all cases of the association of ideas can be tested only by the continued study of the phenomena as bearing for or against the principle.

Ordinary cases of association by (1) contiguity in *space* and *time* easily fall under this general law. As has already been said, things that are together in space, and events actually contiguous in time, never become associated unless they have become mentally united — perceived or thought of as contiguous. But in every complex act of perception or analytic activity of thought, attention and discrimination are preparing the material for a variety of possible ideal associations.

(2) Cases of *means* suggesting *ends*, of *causes* suggesting *effects*, of *signs* suggesting *things signified*, and the reverse, are also not difficult to account for under the same principle. The sight of the poker suggests the idea of poking the fire; or the sight of a poorly burning fire suggests the idea of the needed poker. Oiled rags, and unignited matches near by, suggest a train of ideas that move along the line of cause and effect. Both cases rest upon previous connections of conscious states of perception or of thoughts about things that embody the results of the actual experience of other men.

(3) So-called association by *contrast* illustrates the same principle. In acquiring our perceptions, and in thinking about objects, we must discriminate opposites — the contrasted qualities and actions of things. Thus the very process of acquiring brings the contrasted things and qualities into a unity within the life of the conscious mind. The original contiguity in consciousness accounts for the contiguity or association which the contrasted ideas of things and of their qualities have. The passage from light to darkness, from joy to sorrow, etc., is an impressive experience. The ideas of light and darkness, of joy and sorrow, thus acquire power to suggest each other.

(4) What is called association by *similarity* is, indeed, one of the most extended and fundamental of the

laws of primary intellection and presentative experience generally. It is for this reason that our ideas of the similar become associated. All conscious processes — attentive discrimination, the formation of complex sensations, our experiences with compound forms of feeling, and the formation of complex ideas by the fusion of simpler ideas — involve the distinction of like from unlike, and the assimilation of the like. But this experience, instead of being something different from the principle of contiguity in consciousness, is precisely this same principle in action, as it were. To maintain a theory of association of ideas by similarity as something different from the principle of contiguity, rests then upon a confusion: *Those laws of mental life which regulate discriminating consciousness in acquiring the original presentations must not be confounded with those other laws which regulate the mechanism of the reproduced and associated ideas.* The former are primitive, the latter derived.

As to both the similar and the contrasted, in idea, different persons differ almost beyond all assignable bounds. This is due to the fact that we do not generally notice likenesses and unlikenesses that have little or no significance for our daily lives. Thus what is very unlike, and so not at all apt to be associated in the ideation of the ordinary observer, is suggested as notably like in the mind of the scientific man. All this shows that the principle of association is to be found in the uniting or separating character of the original activities of perception and of thought.

The discovery and discussion of the laws of association has received much attention from psychologists from Aristotle downwards. This great thinker enumerated three primary laws, — contiguity in time and space, resemblance, and contrariety. Coming down to Hume we find him omitting contrariety and adding cause and effect. The principle of similarity — ideas suggest like ideas — is the one generalization that has maintained itself as the strongest rival of the principle which we adopt. The acute psychologist Höffding has even taken the position that so far from association by similarity being resolvable into association by contiguity, every association by contiguity, on the contrary, presupposes an association by similarity, or at least an immediate recognition of similarity. Now the latter part of this statement of Höffding is true if only we strike out certain words, change others, and make it read as follows: "Some" (not "every") "association by contiguity presupposes . . . an immediate recognition" of similarity. This virtually admits the principle for which we are contending; namely, that the laws which regulate the succession of associated ideas are a derivative of the laws which regulate the binding together of elements and objects into the unity of one field of consciousness.

We may understand the truth of experience better by analyzing briefly an example. Let us take the one selected by Höffding himself as illustrating "the innermost germ of the association of all ideas." I see an apple on the table before me and quickly find myself thinking of Adam and Eve. Undoubtedly this is because, as Höffding says, I have — though so quickly as to be hardly "conscious of it" — had the idea of the apple on the tree of knowledge. But the explanation does not consist in the bare similarity of the two ideas as such. The train of ideas does not run thus because the apple on the table, being in idea *similar* to the apple in the Garden of Eden, has suggested the latter, and this latter has then suggested Adam and Eve. [Surely the latter case of suggestion is not easily explained by similarity of ideas.] On the contrary, the sight of an apple and its name have long ago so been bound together, by being repeatedly grasped together in consciousness, as to constitute a process of immediate recognition. The idea of an apple has also, by reading or hearing the Biblical story, been often brought into close mental contiguity with the ideas of the tree in the Garden of Eden, and so of Adam and Eve. It is because of these processes of previous recognition, due to a variety of causes, and not because of any special power of like ideas to suggest like, that the idea of Adam and Eve follows the idea of the Garden of Eden, which idea was itself suggested by sight of the apple.

Indeed, Höffding virtually admits the insufficiency of his analysis when he proceeds to maintain that the "two laws may be brought under one and the same fundamental law." This law he awkwardly calls "the law of totality," and ascribes it to "the synthetic activity of consciousness." But this is to adopt our principle.

Secondary Laws of Association. — Particular cases of the association of ideas are found to require a variety of considerations for their satisfactory solution. Indeed, one's associations of ideas embody pretty much all of one's past experience. So that the answer to the question, Why have I just now this particular idea rather than some other? may have to be sought at the roots and all along the obscurer growths of my entire mental life.

Among the more prominent reasons for particular associations of ideas the following may be noted: (A) The assumed *nature* or constitution of the mind. Certain "natural" tendencies, which powerfully influence the original acquisitions of the mind, extend themselves to the processes representative of these originals. Hence different persons differ in respect of the association of ideas, because of (B) *temperament*, sex, race, age, etc. Sanguine, sentimental, and phlegmatic men differ in the speed and character of their mental train. Vague longings and sentiments which spring up at puberty, and the tendency to reminiscence in old age, are influential factors. But (C) the transient or more permanent *mood* determines the association of ideas. We think of things gay, when we are gay; and of sombre things when our mood is sober. The ideas of Milton's "L'Allegro" are suggested at one time by the same experiences which make us recall the ideas of "Il Penseroso" at another time. (D) The intensity, fulness of content, and connection with vital interests — the total *strength of impression* — belonging to the original states determine the actual association of ideas among the possible connections of those states. (E) It is the more *recent* ideas which, other things being equal, determine the direction of the immediately following train of associated ideas. Freshness of the original experience contributes strength to the associating tendency of the representative idea.

But, finally, (F) *repetition* and habit are of the very highest importance in the mechanism of ideas, as they are in the explanation of all our mental life.

Interesting illustrations of most of these secondary laws of association are furnished by the results of Dr. Scripture in his experimental investigation of the "Associative Course of the Ideas." Thus a Japanese, on being shown a red light, after experiencing an agreeable feeling and uttering an exclamation of pleasure, had the mental picture of the sun and then of the Japanese flag (which has a sun on it). Another observer, on touching leather, had at once the visual image of yellow chamois skin and of men whom he had seen selling it but two weeks previously. Still another, on hearing the sound of a rolling ball, had the experience of an unstable mental image which defined itself as that of a marble rolling over a board (an African sport). A fourth observer, on being shown the picture of a brown bear, imagined a scene in which men were being dragged off by Polar bears, as in a narrative which he had read four years ago.

"Freeing" of the Ideas. — For purposes of recognition, and as motives to immediate action, there is a certain great advantage belonging to the most intense, life-like, and objective of our representative states. But for purposes of what is called "abstract" thought and of language, another sort of advantage must be acquired by these states. When vivid, life-like, and capable of easy objective reference, our ideas are most like our concrete states of sensation and perception. But they are then capable only of *representing* a very limited number of the objects of our sense-perception. If, for example, I examine most minutely a single flower, and thus carry away a detailed and accurate picture of that particular flower, this picture will not do to represent some other flower, even of the same species.

A process sometimes called that of "freeing the ideas" must then take place, if we are to be able to picture classes of objects. Such a process will involve these two connected phases: (1) The individual complex ideas (or ideating processes), by losing more and more of those factors which were given to them by previous experiences, become capable of representing a larger number of experiences that are similar only in respect of a smaller number of characteristics. The ideas are thus "set free" to represent a larger number of somewhat less similar individuals. (2) These same ideas, by losing the fixity of position which they had in a small number of series, become capable of association with a larger number of ideas to form new combinations and new series. They are thus "set free" to enter into a larger number of combinations.

It seems, then, that *the less vivid and lifelike any idea is*, *as compared with any single presentative object*, *the more service it can do in representing an entire class of objects.*

Schematizing of Ideas. — Substantially the same changes in the processes of ideation may be described as the progressive "schematizing" of our representative images. As the application of ideas to the development of knowledge widens, the factors which can become fused in any complex idea, and so made to stand for an entire class of objects are reduced in number. The unessential or relatively useless factors are dropped out; the few essential or relatively most useful factors are retained. The rude drawings of primitive peoples, the origins of the different alphabets, the gruntings and gesturings with which savages help out their meagre language, the use of signs in mathematics, illustrate the same psychological truth. The *schema*, or "sketching" idea, does the work of a long series of more lifelike ideas.

In this same development the superior *objective* qualities of the ideas of sight and touch become apparent. One can picture schematically to one's self a heliotrope or a Japanese lily in terms of sight; but the *schema* of the smell of either of these classes of flowers is much more evanescent. Solid and real things require schematic reproduction in terms of the tactual and muscular experience. In general, *the more "abstract" the ideas derived from our presentations of sense become, the more do they consist of highly schematized images in terms of sight and touch.* But these classes of ideas belong to the more intellectual and objective of the senses.

A correspondent of Galton, on closing his eyes, habitually saw arise before him a series of concrete visual images, of which he seemed to be only the passive spectator; for example, a bow — an arrow — hands drawing the bow — a cloud of arrows — falling stars — flakes of snow — ground covered with snow, etc. Compare *this experience* with what goes on in the consciousness of the average reader of the *words describing* the experience. How lifelike but limited the one associated series! how abstract but free in association, the other!

Plan in All Ideation. — The earlier processes of ideation seem peculiarly mechanical in character. They therefore lend themselves easily to experiment and to the more mechanical theories of the mental life and mental development. But clear traces early appear of something, even in the process of ideation itself, which oversteps the bounds of mere mechanism. The beginnings of an organization of experience are, indeed, largely passive. But we have already seen that attentive and discriminating consciousness, as announcing the presence of activities which will develop into faculties of judgment and will, are everywhere present. So in the formation and control of associations among the ideas, the conscious desires, choices, and rational judgments of the mind, will come more and more into evidence. The systematic and purposeful character of the dominant associations, and not merely the dominance of the systems of associated ideas, will be established. The mind will appear less as the subject and victim, and more as the creator and master of its own ideas.

[In modern psychology, the Herbartians in Germany and the writers of the Associational School in Great Britain have been prolific of treatises on this subject. To these treatises general reference may be made. The experimental treatment of the fundamental phenomena is given by Scripture: The New Psychology, Part II, "Time," especially Chap. xiii. Monographs may be consulted, by Hering: Ueber das Gedächtniss, etc.; Uphues: Ueber die Erinnerung; Ebbinghaus: Ueber das Gedächtniss; Stricker: Studien über d. Association d. Vorstellungen; Binet: La Psychologie du Raisonnement; Ferri: La Psychologie de l'Association; and Nichols: Memory.]

PART SECOND

THE DEVELOPMENT OF MENTAL LIFE

CHAPTER VIII

IMPULSE, INSTINCT, AND DESIRE

We have now completed the preliminary survey of those elementary mental processes which enter, as factors or constituents, into every conscious state of the adult mind. These processes are what we discover when we direct our attention, in the way of searching *analysis*, upon the varying aspects of the stream of consciousness. It is by their growth, in varying degrees and modes of *synthesis*, that the formation of "faculties" and the development of the entire mental life is explained. Sensation, feeling, conation with its accompanying movements, and the processes of representative image-making; and over all, and in all, attentive and discriminating recognition of the like and the unlike; — these are the transactions which are ceaselessly going on in the conscious Mind.

It would be a mistake, however, to suppose that mental growth can be explained, or even described, as *mere* combination of these elementary mental processes. It will soon appear that certain principles must be recognized which, as it were, lie deeper down in the constitution of the one subject of all conscious states. But it is substantially true of all developments, that the factors which enter into them do not account for their own existence or for their modes of combination. Preëminently is it true of the mind that It grows according to ideas (a "plan"), which are not by any means consciously recognized as the objects of its own pursuit and choice. Mental life runs a career which is *sui generis*, and which is regulated by laws of its own, in the following of a purposeful order,—the so-called "nature" or "constitution" of a human mind.

In all the more epoch-making stages of mental development, what appear as wonderful new faculties manifest themselves. We shall see this to be true of perception as objective cognition, of ideation as recognitive memory, of scientific acquisition, and of freedom in self-control. At the same time, it remains true that it is by the combination of the elementary processes, in ever-increasing complexity, up to the limit of complete development, that the formation of faculty and the attainment of "Mind," in the full meaning of the word, are to be explained.

We now turn to the work of tracing the development of mental life along its different main lines of growth and maturing. But, first of all, there are certain obscure and complex processes that arise chiefly in the fusion of affective and conative elements, with a *minimum* amount of intellection. These processes emphasize the *appetitive* nature of mind. They furnish "push" and "impetus" to its earliest and least intellectual forthputtings. In the case of minds which attain to a higher and more distinctly rational self-control, these processes are either refined and directed toward more clearly recognized ends, or they are subordinated. They may be somewhat roughly classified as Impulse, Instinct, and Desire.

Appetitive Consciousness, in General. — It follows from the very nature of those conscious states which are properly called "appetitive" that they are as numerous in kind as are the forms of feeling in which they take their rise. They all have this in common, however, that they belong to man as made for action. They equip him for, and propel him toward, the doing of something in the attainment of ends. But the growth of experience consists partly in learning the proper inhibitions to impulsive movements, as well as in learning the proper movements to satisfy the impulses. Moreover, those forms of feeling in which the movements take their rise, and the resulting movements or inhibitions of movements, are all too customarily tinged with a decided coloring of pleasure-pain. This may be illustrated by a simple reference to the stock example of the child that impulsively reaches for the candle, gratifies its impulse to touch the flame, and receives for the future an inhibitory memory-image stamped into the very organism with the sharpness of its pains.

Various classes of appetitive states of consciousness have been recognized by psychologists, and a variety of terms employed for them. But it is not necessary to enter into details in order to understand this side of mental development. In describing briefly the three prominent, yet related, forms of "appetition," the following remarks are pertinent: (1) In no case does psychology intend to treat of the unconscious or *merely* reflex and automatic combinations of the motor organism. The words "impulsive" and "instinctive," when used to designate such combinations, are of physiological and not psychological significance. The psychologist deals with impulse and instinct, as well as desire, only when they become *conscious states*. (2) Impulse, instinct, and desire, considered as psychoses, are terms which may be applied to explain a great variety of bodily movements. There is often much doubt which of these three words best describes the kind of consciousness that goes with a particular variety of movements. Yet when more carefully considered, each of the three seems to emphasize a somewhat different aspect of similar complex conscious states.

Nature of Impulse. — The psychological conception of impulse may be defined as follows: *a conation, initiated and fused with a feeling of craving, in view of some object of sense-perception or imagination, with a tendency to discharge in a complicated form of purposeful movements.* The definition lays emphasis upon the *impelling* power of such feeling-full volitions as have reference to the attainment of some end. This end itself, however, may be only very obscurely perceived, and not at all reflectively and deliberately chosen. The infant kicks, strikes, bites, clutches with its hands, makes its first efforts at creeping and walking, — so far as all this is not a matter of pure physical mechanism, — "impulsively." In much the same way (in impulsive fashion) the trained athlete performs his feats, the fencer thrusts and parries, the thinker seizes and follows some mental clue. In similar fashion do men and women fall in love and pursue the object of their passion; heroes, aglow with excitement, hew their way or lead their troops in battle; business men buy and sell stocks, or gamblers bet at cards.

Inhibition of Impulse. — Nothing is more important than to secure the right checks to the primary forms of appetitive conscious states. The human being with uninhibited impulses would be left in sorry condition indeed; strictly speaking, such a being could not continue in existence at all, but would speedily destroy itself. One notable difference between the trained adult and the lower animal, the child, the insane and diseased will, or the subject of hypnotic suggestion, is that the former has a reserve of inhibitory influences, in which the latter are lacking. It is, first of all, the growth of experience with the painful or pleasurable consequences of our impulsive efforts to gratify our cravings that furnishes a system of inhibitions upon the natural impulses. It is, afterward, the development of the reasoning powers, and the pursuit of ethical and æsthetical ideals, which strengthens, refines, and elevates this system of inhibitions.

Physiologically expressed, it may be said that the power of inhibiting impulses implies a reserve of nerve-energy in the higher psychic centres of the brain. When this reserve is wanting, the control of these centres over the lower parts of the nervous mechanism is weak and insufficient; the discharges from the lower centres are too prompt and explosive, as it were. Psychologically considered, we notice in persons of *over-impulsive* characteristics that they lack reserve in expressive action and in movements designed for the immediate satisfaction of excited sense or feeling. Various forms of mania are characterized in this way. The dipsomaniac drinks impulsively; the kleptomaniac steals impulsively; the planomaniac wanders off impulsively; the erotomaniac gratifies sexual passion impulsively.

Development of Impulse. — There are two sets of considerations which, by their mutual action, determine the development of the mind in its impulsive states of consciousness. First, the impulses themselves tend to become more numerous and complicated as intellectual development proceeds. We are accustomed to think of the child as preëminently the creature of impulse. It is true that the power of impulse is relatively large in its case; and that the area in its consciousness given to movements prompted by craving and going out toward ill-defined ends, is the more extensive. But the result of experience itself is to uncover and multiply other and more complicated forms of impulse.

But, second, the very conditions of mental development are such as to reduce the various impulses to some sort of unity. What is called "conflict of impulses" very early develops. The fierceness and the complications of such a conflict increase, within certain limits, as experience expands and hardens; that is, with the development of mental life. Two modifying results must, therefore, be secured: (1) Certain impulses become dominant; they attain the position of habitual exciters and controllers of the spheres of action belonging to them. This secures a certain "consolidation" of impulsive movements. The movements lose their earlier more random and purely automatic character; they become habitually adapted to the realization of the dominant impulses. (2) At the same time, deliberation and rational regard for consequences conduce to the control, in the interests of more remote ends, of the mental appetencies. For example, the confirmed dipsomaniac is under the dominant impulse to gratify the craving for drink, while the child is swayed by a constant change of appetencies. But the adult drunkard will delay the gratification of the one impulse and will plan ways to escape its more disagreeable consequences, as the child will not in the case of any one of its numerous impulses.

The Appetites. — The three forms of appetite popularly recognized may be considered as impulses which develop early and in all human beings, on a basis of special physiological conditions. These three forms are, of course, the appetite for food, the appetite for drink, and the appetite of sex. The sucking of the new-born child is probably a purely physiological reflex; but through experience in being fed, a truly psychical appetency arises. This acquired infantile appetite consists of uneasy, ill-localized bodily sensations, a more or less vague psychical desire for an object already experienced as pleasure-giving, and the revived mental images of satisfactions already received in the experience of this object (the nursing-bottle or the mother's breast). "The appetite for food," as it exists in adult life, is a much more complex affair.

What is called the "appetite of sex" cannot be spoken of as a single or a simple impulse. It is an exceedingly variable and complex mixture of sensation, imagination, feeling, and will. It emerges in consciousness as a recognizable impulse comparatively late in the development of mental life, and under the influence of a great variety of domestic, social, and more distinctly legal influences. Its beginnings manifest themselves sometimes as a matter of feeling gentle repulsions, or "shyness," sometimes in the form of vaguer or more definite attractions mingled with curiosity, desire of approbation, and undefined cravings. While it is probably never wholly free from admixture of elements due to the difference in the bodily organism of the two sexes, it is also seldom sunk so low as to be a mere physical impulse dissociated from ethical or æsthetical significance in the estimate of the mind which feels it.

Impulses from the Emotions. — Each of those forms of intense feeling which we call "emotions" has its characteristic, correlated impulse. The impulse of anger is to strike, or kick, or resist in some way. "Love," says Bain, "is completed and satisfied with an embrace." The impulse of fear is to run away, or to assume an attitude of defence rather than of attack, as in the case of anger. When the feelings of curiosity, doubt, or belief, reach an emotional stage, they manifest appropriate impulsive and purposeful movements. Curiosity *impels* us to look attentively, doubt to look suspiciously, and belief to look confidingly, at its object. These "innate" impulses, as they are sometimes called, are restrained in the interests of habitually or deliberately chosen ends. But the restraint itself is inevitably connected with a feeling of tension which is highly significant of the explosive condition of the motor organism.

Nature of Instinct. — Few words have been employed with more pardonable indefiniteness, and even ignorance as to what really corresponds to them, than the word "instinct." By common agreement, however, the instincts are thought to have their origin for the individual in certain impulsive forms of feeling, which set a mechanism already prepared for them, as it were, into movement in a purposeful way. Thus far instincts and impulses are alike in their psychological origin and psychical character. The proper restriction of the word "instinct" should be made, it seems to us, in connection with the interests of the *species*. By instincts, then, we understand *such impulsive activities as belong to all the members of a class, and thus exhibit themselves, either at particular periods or uniformly, in the development of the individual as a member of the species, or in the propagation and preservation of the species.*

In the case of man it appears that no perfectly clear distinction can be made between his impulses and his instincts. The relation of the individual to the species is such, however, that human instincts are relatively few, and human impulses relatively many, when man is compared with the lower animals. Yet the meaning of the word instinct can be enlarged so as to include those more social forms of the functioning of the mind on which the welfare of each individual as a member of the race, and of the race as an aggregate of individuals, is dependent. There seems to be a show of psychological science in speaking of the more social emotions and sentiments, as they operate to produce common movements in large multitudes, as "specific instincts." But this stretches too far the figure of speech by which we compare men building the "organism" of society to birds building nests, or to bees and ants constructing their community arrangements.

Impulses and instincts have most psychical characteristics in common; they are largely similar appetencies of mind resulting in similar forms of purposeful movement. We may often be in doubt which word most properly to employ. For example, the bird may be said to mate, and to build its nest, either as the result of impulse, or instinctively. We might explain the child's beginning to walk, and the bird's beginning to fly, in the same double way. In case the word "impulse" is used, the emphasis is laid upon the forceful influence of that craving in which the ensuing series of complicated movements takes its rise. If the word "instinct" is used, attention is directed to the ideal end of the movements; and more emphasis is laid on the at least obscure mental representation of this end. But this end has no meaning *for us*, however the case may be in the consciousness of bird or of child, without taking the welfare of the species into the account.

Significance of the Instincts. — However the instincts of man are explained and interpreted, there can be no doubt that their most obvious meaning is, as has been said, connected with the propagation and preservation of the species. Further than this we find a considerable variation of opinion not only possible, but even encouraged by different aspects of such complex phenomena. Some writers over-emphasize their physiological explanation and their merely biological significance. This emphasis may even go so far as to reduce the young human animal to a complex sensory-motor mechanism. But from this point of view we must remind ourselves that the proper sensory-motor and ideo-motor mental activities seem inseparably linked in with the possession and use of an appropriate mechanism. A writer on instinct has put the case in this way: "Has the bird a gland for the secretion of oil? She knows instinctively how to press the oil from the gland and apply it to the feather, etc." To speak of "instinctive knowledge" is, indeed, a misuse of terms. But that psychical function and organic development are correlated, there is little or no doubt.

The metaphysical explanation of instinct is suggested to psychology by such observations as those made by Goethe. "There is in the curious and kindly operation of instincts something which, whoever studies and does not believe in God, will not be aided by Moses and the Prophets. In these instincts I perceive what I call the omnipresence of the Deity, who has everywhere spread and implanted a portion of his endless love, and has intimated, even in the brute, as a germ, those qualities which blossom to perfection in the noblest forms of men."

The psychological explanation of human instincts is the only one to which it becomes us to refer in the present connection. This explanation (?) barely describes the probable complexion of a particular class of intricate but confused psychoses, and points out the relations sustained to the existence and well-being of the species by the movements to which the psychoses give rise. It involves the physiological view; it suggests for further reflection the metaphysical.

Kinds of Impulses and Instincts. — The exact classification of the elementary forms of appetitive consciousness is not a matter of great importance to the more general science of psychology. Minute study of specific impulses and instincts is, on the contrary, of great importance to the student of comparative psychology. It accords with our views of the nature of the latter, that, in all the higher mammals, impulsive and instinctive performances are not absolutely uniform and infallible, but are modifiable by experience. Recent investigations in biology seem to have shown that even the most primary of them generally, if not uniformly, require at least some individual example for imitation, or some specific form of stimulation, to render them operative. The duckling that sees the mother duck swimming, and the infant that feels the pressure of the floor underneath its body and, simultaneously, the impulse of some distant object which it desires to reach, begin to swim and to creep — "*instinctively*." But the one is "originally endowed" with a complex swimming, and the other with a complex creeping, mechanism.

It follows that the gap between blindly reflex or automatic mechanism and the most intelligent acquired aptitudes may be filled up with an indefinite number of kinds of impulses and instincts. Thus we hear of such instincts in infants as the instinct to suck, to bite, to clasp, to put into its mouth, to cry, smile, creep, walk, imitate, emulate, fight, etc. We hear also of instincts of play, of shyness, sociability, secretiveness, modesty, etc. Why not say, in a word, that the human animal "has an instinct" to do everything that it can do; and that it does instinctively everything it actually does in the manifold use of its various powers?

In studying the development of mental life, it is, therefore, important to bear in mind how these impulsive and instinctive conscious states are the starters of the whole process of development. All growth of faculty, all beginning of psychical organization, comes in this way. Just as there are as many kinds of instincts and impulses for squirrels as there are things which young squirrels can do,—and among them collecting and storing nuts is, perhaps, most specific and noteworthy,—so the human being has all the increased number and superior kinds of impulses and instincts which belong to him as human.

Nature of Desire. — *By desire we understand that blended feeling and conation which is directed toward some object mentally presented or represented, and of whose pleasure-pain characteristics we have had previous experience.* Thus although all desires are forms of craving and of initial conation, they involve a more intelligent and contemplative attitude toward some particular object than do the impulses or instincts. Desires may, indeed, follow their objects as blindly as impulses or instincts do; but desires are less blind toward their objects. One knows what one desires; but the outreaching of impulsive or instinctive feeling is often enough toward — one knows not what.

The psychology of the desires requires that they should be considered in relation to each of the three forms of the functioning of mind which they involve: (1) Intellect and imagination take a relatively large part in those appetitive conscious states to which the name "desire" is properly given. Such states cannot arise until some presentative and representative knowledge of objects has become possible. Definite, strong, and persistent desires require that their object should be held before the mind as a possible object of attainment. Infants may desire the moon; but the further work of intellect in constructing the moon as such an unattainable and undesirable object as it actually is, destroys it as an object of desire for the adult mind. (2) Without excitement of feeling no desire is possible. But, in general, the massive, low-toned pleasurable feelings are freest from admixture of desire. The rule is that desire characterizes our conscious attitude toward those experiences with which remembered or anticipated pleasure has become connected. Though, as Dr. Ward has said, "instances are by no means wanting of very imperious desires accompanied by a clear knowledge that their gratification will be positively distasteful." But (3) desire is, of all conditions of consciousness, most nearly continuous with what we call "willing." What we strongly desire that we *will*, unless some inhibitory influence checks the transition from the one conscious state to the other. "I will have" follows naturally upon "I badly want." For there is a *dynamic* element in desire which partakes more of the nature of conation than of feeling, as such. Desire is not, however, identical with choice or decision, or accomplished will. How desire differs from the completed "deed of will" will appear later.

Doubtless the complexity of those different forms of appetitive consciousness, to which the name "Desire" is given, accounts for the confused views of psychology on the subject. Thus Rabier, after analyzing correctly every desire into three elements — a sensational (or affective), a representative, and a dynamic — makes the rather sentimental attempt to reduce them all to love, with its aspiration to possess its object. Other writers would reduce all desires to forms of the Ego's effort.

It may be argued against the dependence of desires upon definite mental representation of an object, that children show signs at an early age of a variety of desires, and that many adults, particularly of a certain temperament, are habitually under the influence of vague and undefined desires. But such conscious states should rather be spoken of as impulsive than as kinds of desire. There is, indeed, a condition of restlessness and feeling of the oppression of *ennui*, which is the fault, the charm, the danger, and the secret, of the most brilliant minds. The entertainment of a varying show of ideals operates to produce fleeting and shifting forms of appetitive consciousness, which have certain characteristics of desire. But whether it be Madame de Staël or the average American girl of fourteen, such experiences belong to the vague cravings and impulsive wilfulness of unorganized mental life. *Desires* mean some definite business on hand in the way of attaining an object. *Strength* of desires belongs rather to the masculine and adult mind.

Conflict of Desires. — The very nature of our experience of the effect of willing upon the gratification of desires is such as to bring about a conflict between them. Indeed, inhibition of desire is customarily the solution of a case of conflict. In the complicated conditions of human living, all our desires tend to become conditional; we desire "*if*," or we desire "*although*" and "*in spite of*," or "*because*." The lazy schoolboy hates his lessons; he desires not their mastery. But, again, he desires to get his lesson, because he desires the promised half-holiday or desires to escape punishment. All this is indirect proof that, while impulse is blind, and instinct only *appears* to, but actually does not, regard intelligently the end, desire is more significant of the development of imagination and thought.

The inevitable conflict of desires would seem to give over the field of consciousness to the possession of the stronger desires. And, indeed, this would be true if the subject of the conscious states were a being of desires merely. What actually takes place in all "pure" conflicts of desire is, either (1) the desire **A** overcomes the desire **B** and leads on to its own appropriate deed of will; or else (2) **A** and **B** hold each other in check and prevent the satisfaction of either, while dividing the appetitive state between themselves, as it were. It is thus that habitually triumphant desires become absorbing passions and disturb the entire mental development, no matter how originally "noble" such desires were. We read, for example, of one Montelli, whose desire for the acquisition of knowledge had made him a sordid intellectual miser, a monstrously learned and yet useless wretch. But the development of intellect and imagination under the influence of æsthetical, ethical, and other practical considerations, tempers the results of the conflict of desires.

Satisfaction of Desire. — The attainment of the object of desire is followed by a unique feeling of "easement" — the pleasurable state of satisfaction. There is always a certain amount of painful tension connected with the continuance of strong desire. This painful tension is often much increased by the swaying of the stream of consciousness from side to side between conflicting desires. In not a few cases the bare relief from this condition of painful tension is the most pleasurable thing connected with the attainment of the desired object. In such cases, "satisfaction" is chiefly a consciousness of release from strain. Where this pleasant relaxation from strain is united with the happiness in possession of the longed-for object, the satisfaction of desire is, above all other conditions of consciousness, itself most to be desired. This experience of all sane and normal minds is a complete refutation of the perverse claim of Schopenhauer, that the satisfaction of desire necessarily results in experiencing the misery of satiety — to be succeeded by new misery of ungratified desire.

Kinds of Desire. — It is convenient, in order to understand the place of our desires in the total development of the mental life, that we should classify them according to the mental processes with which they are connected. There may then be distinguished, (1) Sensuous desires, or those which arise out of bodily cravings and find their satisfaction in some physical object; (2) Intellectual desires, or those cravings which arise from the constitution of the mind as intellect, and have their satisfaction in certain intellectual activities, or states; (3) Sentimental desires, or those which arise in the contemplation of ideals of beauty or of moral goodness; and (4) a class which may be called pathological, and which comprises all the overgrowths, or monstrous growths, from other forms of desires.

Finally, we are reminded that the character of the mind's desires cannot be understood as separated from its entire development. My desires cannot be weighed and estimated as something apart from me. They do, indeed, often seem to take the position of impulses received like impacts from without — felt *by* the mind, but not *of* the mind. Yet, again, it is even more true that, as a man's dominant desires are, so is he.

[On Impulse and Instinct, comp. James: The Principles of Psychology, I, xxiv; Romanes: Mental Evolution in Man; and Lloyd Morgan: Animal Life and Intelligence. Valuable observations are to be found in Preyer: Mind of the Child, I, xi; Perez: L'Éducation dès le Berceau. Among German monographs are Schneider: Der Thierische Wille; and Santlus: Zur Psychologie d. menschlichen Triebe. The fuller treatment of Desire is to be found in works on Ethics: see especially Sidgwick: The Methods of Ethics, iv; and Leslie Stephen: Science of Ethics, ii.]

CHAPTER IX

PERCEPTION BY THE SENSES

All knowledge of things, and all the general principles which psychological science can establish as to the conditions and laws of such knowledge, must take their start from —

The Fact of Perception by the Senses. — It is matter of universal experience that the adult man learns much about the qualities and behavior of things by coming into what appears as a "face-to-face" relation with them through his senses. Let one open one's eyes upon a landscape or upon any object in a landscape. At once, as it seems, a "field of consciousness" arises which consists of a number of objects set in relations of space to each other, — a tree here, a house there, and over yonder a background of mountain. Or let one gaze fixedly at any particular object, and at once it is known as having a certain size and position (up and down, right and left), and as colored white, or red, or green. Or again, let one approach any tree and touch or push against it; one is immediately conscious of its more solid qualities of extended resistance. One knows without argument that one must pass around it in order to reach the other side.

Such experiences as these are every-day matters. Indeed, we may almost say that our life, hour by hour, is largely made up of similar experiences. For, although considerable periods may elapse without our making an attentive examination of our perceptions, either for purposes of psychological science or of serious practical import, we are all the while largely guided by them. For example, I am directed more safely along the path where my daily interests take me by this series of perceptions, because they are too familiar to attract, or to need, much attention for themselves. Again, in reading, it is the flow of ideas to which my mind is chiefly attentive; but if I do not mind the series of printed symbols, to some extent at least, I cannot apprehend the author's ideas.

Definition of Perception by the Senses. — In a preliminary way such experiences as have just been described may be defined as constituting perception; and, therefore, *Perception is the consciousness, or immediate "awareness," of external objects by the senses.* Some such descriptive sentence as this would probably be satisfactory to almost all adult minds. For the undoubted fact of experience seems to be that (1) *at once* and without any intervention of mental processes occupying time, we become aware of (2) an *external* object — a thing "set out" of us and "spread out" in space; and this (3) by the *senses, without assistance* from memory, imagination, or reasoning. Not one of these three assumptions, however, accords strictly with the conclusions of a scientific psychology.

Such an analysis as any plain man may make reveals abundant reasons for modifying this definition of sense-perception. For (1) any one may readily establish the fact that, after all, it does take time to perceive some things at least, and that, in the case of unfamiliar and complicated objects, we are often in doubt as to what we have *perceived*, even after considerable time. That all perceptions require time is readily proved by laboratory experiments. (2) Moreover, from the psychological point of view, every one's perception is, of course, his own mental affair; the object *is that of which* he is conscious, a "field" of his consciousness — to use the phrase already explained (p. 24 f.). But the same object is in this case "external," a real thing "set outside" and "spread outside" of him. How can this be? Whence comes this *externality* in which the object is said to be perceived? (3) Once more, it is not difficult to discover the fiction in the phrases, "unaided senses," or "mere sense." For if the case is one of any complication or difficulty, the perceiver himself knows that he is trying "to make up his mind" as to what the object really is. He looks, instead of merely seeing; or listens, instead of merely hearing; or feels with active hand, or other movable organ of the body, instead of merely letting the object come into passive relations with his skin. But looking, listening, feeling, are activities involving conation, ideation, discriminating and discerning consciousness. They issue in a judgment pronounced: "It *is* this [or that] particular object."

The bearing of this plain man's analysis, and of the much more complete analysis of psychological science, upon our views as to the nature and development of sense-perception will appear later on.

Problem of Perception. — To the unreflecting mind there appears to be no mystery about our daily use of the senses. To such a mind there is no *problem* of perception. Illusions and hallucinations seem indeed interesting. The phenomena of hypnotism, telepathy, and so-called spiritualism, appear profoundly mysterious. But just ordinary, every-day seeing, hearing, tasting, smelling, and feeling of things — what that is problematical or scientifically interesting can there be in these common-place conscious states? For the genuine scientific man and the devoted student of science, however, the case is precisely reversed. Ordinary perceptions are most interesting, most profoundly mysterious. And there is very little doubt that the scientific mastery of these will one day give us the key to all the wonders in which the lovers of the marvellous find their chief delight.

Perception by the senses is, then, a profound and difficult problem. It is rather a long series, or a confusing tangle, of problems. They may all, however, be stated conveniently in some such way as the following: *How, by combination and development of the elementary processes already described, does the seeming "immediate awareness" of the objects of sense, as external and extended, come about?*

Physiological Conditions of Perception. — The *coördinated functioning* of all the parts of the body concerned in the act of perception — no less than this — constitutes the physiological conditions of perception. Two sets of factors, however, are especially important. These are (1) the combined and purposeful movement of the external organs; and (2) the formation and use, in combination, of "association-tracts" — particularly between the lower and the upper parts (the hemispheres) of the brain, and between the different centres of the upper parts of the brain. The first set of factors is made necessary because, as will appear later, it is only by active use of movable external organs that actual "perception," as distinguished from the merely theoretical having of sensations, can take place at all. The second set of factors is made necessary, because all the elementary mental processes, and all the nervous centres of the brain whose functions form the physical basis of these processes, are correlated and combined in the complex activity of perception. Two principles more important to understand than these cannot be conceived of in connection with this subject.

Perception as involving Many Processes. — The problem of perception as just stated has been made to include one important truth in its own answer. This is the truth that perception, as an adult experience, *does* come about by combination and development of more elementary processes. Let us now expand this statement into the following five particulars: (1) Complex forms of sensation, due to different admixtures of qualitatively and quantitatively like or unlike sensations, and varying in a discernible way according to the locality of the organ stimulated, serve as "local signs." (2) Representative images of past sense-experiences recur in consciousness and "fuse" with these complex sensations and with one another, to determine the object as relative to other objects. (3) Feelings of interest, expectation, familiarity, or shock of surprise, etc., and having a "tone" of pleasure or pain, influence the speed and the character of the interpretation given to the sensations. (4) Attention, especially as influenced by these feelings and as "focused" and "distributed" in the complex field of consciousness, chiefly decides the character of the perceived object. (5) Discriminating consciousness, which assimilates, differences, analyzes, synthesizes, and judges, makes "intelligible," as it were, the complex forms of sensation-experience.

Besides all this it will appear that certain laws of our mental life, or unvarying forms of the functioning of the mind, must be admitted in order to give to ourselves anything approaching a complete account of sense-perception. We can scarcely take the first steps in this science without recognizing the truth that *perception by the senses is something far more, and quite other, than an "aggregation," or "agglomeration," or "association," of sense-impressions passively received.*

The word "perception" has been variously employed by psychologists of varying views. This variation is chiefly concerned with the difference between *sensations* and *perceptions*. The so-called "sensational school" would resolve this difference mainly into one of complexity. But, as will appear, the difference is much more than this; and, so far as can be determined, the development of perception moves quite as much from that which is obscure and complex to that which is complex but clear, as from the merely simple to the clearly complex. Perception, then, involves growth in discrimination.

Other writers admit an element of representation in all perception. Thus Binet defines it as "the process by which the mind completes a process of sense by an escort of images." The more detailed statement of Sully is as follows: "Perception is that process by which the mind, after discriminating and classing a sensation or sensation-complex, supplements it by an accompaniment or escort of revived sensations, the whole aggregate of actual and revived sensations being integrated or solidified into the form of a percept." According to Professor James, too, "perception differs from sensation by the farther facts associated with the object of sensation." Present perception is, then, relative to our remembered and ideated experiences.

We shall show, however, that it is not proper even to speak of an "*object* of sensation." [Sully's reference to the "discriminating," "integrating," and "classing" activity of mind is in evidence here. Even Mr. Spencer speaks of perception as a discerning of the relation or relations between states of consciousness.]

The full difference between sensations and perception, as we conceive of the latter, can be stated only by giving the entire doctrine of perception. In a word, however, we may say: Sensations are those modifications of consciousness which are produced by external stimuli, when such modifications are, for theoretical purposes, considered only as passive forms of conscious content; while perception includes also all the activities of the mind regarded as engaged in, and as developing the faculty of, the immediate cognition of external and extended objects. We *have* sensations; but we *perceive* objects.

SENSATION-FACTORS OF ALL PERCEPTION

It has already been made clear that our ordinary sense-experience results from a "fusion" of many sensation-processes into a complex result. This fact makes necessary some further treatment of the following topic: —

The Nature of "Sensation-Complexes." — The whole construction and the activity of the nervous system provides for the fusion in one so-called "sensation-mass" of many different sensation-factors or simple sensations. These, so far as we may regard them merely as "*data*" of perception, are given to consciousness already fused. The earlier work of discriminating attention is, therefore, chiefly analytic. The case of the skin illustrates this truth. I *feel* the marble to be, at one and the same time, cold, smooth, and solid. But the *cold*-feeling of the extended object results from the fusion of many temperature-sensations due to the excitement of a great number of cold-spots. The smooth-feeling comes from the fusion of many pressure-sensations; while the sensations which indicate its solidity are the resultant of intermingling factors from muscles, skin, and joints (see p. 69 f.).

All the sensations, by interpretation of which we arrive at the perception of external and extended objects, are sensation-complexes. They are *mixtures of sensation which have an indefinite variety of compound characteristics, but which also have some specific sensuous character that is prominent in the compound.*

Sensation-Complexes of Hearing. — Among all sensations those of hearing are freest from original mixture with other kinds of sensuous experience. These sensations are "purest," and mix most with each other alone and least with other kinds of sensations. The merely acoustic character of a "clang" (see p. 65) is a pure sensation-complex of sound. But, plainly, some of our sense-consciousness inseparably connected with hearing sounds is not *purely* acoustic. The perception of a door slam consists partly in feeling the massive vibrations of the air not only as they are communicated to the ear but also as they beat against the other bodily surfaces. Any one sitting with one's back closely pressed against a board in contact with a grand organ that is being played appreciates the massiveness of the sounds by the vibrating molecules of the entire trunk. We shall see subsequently how all space-perception by the ear involves the fusion of other sensations, and images of sensations, with those which are *purely* acoustic.

Sensation-Complexes of Sight. — Sensations of color and of light never arise in adult consciousness as "pure" sensations of this particular kind. It is things which we see;

and this "seeing" is not with the retina alone. The eyes are constructed so as to be moved; and it is with moving eyes that our perception of external visual objects is attained. Hence with sensations of color and light there are always blended the effects of past and present movements of the lenses and of the entire eye-balls. Tactual and muscular sensations result from using the mechanism of vision; these tactual and muscular sensations fuse with those of light and color in the constitution of all visual "sensation-masses." In other words, sensations of light and color are experienced, not as pure and apart, but as fused with tactual and muscular sensations due to unfinished, or just completed, or anticipated movements of the eye.

Sensation-Complexes of Skin, Joints, and Muscles. — We have already illustrated the nature of all sensation-complexes by reference to the mutually helpful action of skin, joints, and muscles. We shall show later how the "externality" of all objects is obtained and emphasized by the combined use of these organs. *Skin, joints, and muscles are, from the first, and ceaselessly, forced into the closest copartnership of activity.* The skin is passively affected by having its areas more or less severely pressed upon. The muscles, too, are probably affected so as to result in sensory modifications of consciousness, by the pressure of sufficiently heavy masses on the skin. And joints crowded together feel differently from joints pulled more or less apart. When the muscles are active, the skin which is stretched over them, or which is in contact with the surface of the object being explored by the moving organ, is modified in a way to keep pace with the contraction and relaxation of the muscles. Such a combination of interdependent activities results in a continuous flow of sensation-complexes of several different orders or kinds. This flowing and changing "sensation-mass" is especially favorable to that interpretation which the externality and extension of things require.

Sensations of Motion. — A characteristic modification of sensory consciousness is occasioned by stimulating closely contiguous areas of the retina, especially when the eye is also permitted to move. The same thing is true of the skin with its accompaniment of muscular and joint sensations. Such modifications may be called "sensation-complexes of motion." The sensation-complexes of taste, smell, and hearing, *of themselves considered*, do not admit of similar modification. In saying even this, however, we must allow for a certain amount of "interpretation" of these motor changes as a necessary condition of their being converted into sensations of motion. The truth of fact is that *certain sensation-complexes of the eye, and of the skin (muscle- and joint-action included), experienced as compound changes of quality, are immediately and instinctively interpreted as "sensations of motion."* We may differ as to how this interpretation comes about; the stages of it may be discriminated in different ways; the degrees of it and the time of its origin may be made the subject of debate. The fact of experience remains the same. Changes of complex quality in the flow of our sense-experience *are* interpreted as movements of things — either over the different areas of our bodies or through the space surrounding our bodies. Such interpretation is made possible for the eye and the skin by the characteristics of the sensation-complexes which the stimulation of their different contiguous areas calls forth.

The final purpose of so early and inevitable development of sensations of motion is not difficult to guess. As a matter of fact, all animals, including man, are peculiarly sensitive to those modifications of consciousness which signify motion. Their very life and all their welfare depends upon this sensitiveness. "Knack of interpretation" in the case of these sensation-complexes — without, of course, clear consciousness of the significance of the experience — marks the earliest unfolding of man's mental life.

The motor sensitiveness of the different areas of the skin can be experimentally tested. Two observers, for example, found that the motion of a metallic point, moving at the rate of 2 mm. per second, could be discriminated when it had amounted to 0.20 mm. on the forehead, to 0.40 mm. on the upper arm, and to 0.85 mm. on the back. But the same point could be moved so slowly as to travel a distance of 6–12 cm., and not be *sensed* as moving at all. From similar experiments two facts become established: (1) Sensation-complexes must change their compound quality discernibly in order to be interpreted as sensations of motion; and (2) the compound quality of these sensations does change discernibly, but with differing degrees of rapidity, for different areas of the nervous mechanism. Even passive bending of the finger was found by Goldscheider to occasion sensations of motion when the arc of its bending was not more than 0.60° to 1.74°.

Visual sensations of motion, with a motionless eye-ball, may be produced in either of two ways: by stimulating contiguous elements of the retina in close succession of time, or by stimulating the same groups of elements with closely successive color-tones. Holmgren showed that when we look at very faint and fine points of light with the eyes elevated, the images seem to move upward in the direction of muscular exertion. Thus sensations of muscular tension may express themselves as sensations of visual motion. The sleeping cat, in the picture on the card, opens its eyes when we change, with the right speed, the object as it appears in reflected light (since the colors on the front of the paper correspond to eyes "shut") to the object as it appears in transmitted light (since the colors on the back, which now shine through, correspond to eyes "open"). Just now the country is full of shows which have their success in substituting a changing series of different images ("kinetoscopic pictures") for a series of actual movements of objects in space.

Sensations of Position.—Here the fact is that *the compound quality of certain sensation-complexes of eye and skin (including the muscles and joints), with the feeling of the accompanying tendencies to motor activities, is interpreted as "sensations of position."* To speak popularly, the skin "feels" differently as its different areas are pressed upon by the same objects; the eye "feels" differently at the different angles of its possible positions,— to the right, left, up, or down; the limbs "feel" differently according to the different positions reached by them, whether passively or actively. Two principles with regard to the origin and development of sensation-complexes of position seem to be capable of defence: (1) Sensations of position are dependent upon previous sensations of motion, and upon the recall of the images of these sensations. (2) Sensations of position involve at least that low degree of discriminating consciousness which enters into every kind of "tact." These sensation-complexes, on account of differences in their compound quality, admit of interpretation which signifies differences that lie beyond themselves. But if there had been no previous experience with the organs in action — no net-work of sensations and series of sensations of motion,—such interpretation would be quite impossible. *The significance which sensation-complexes of position attain in the way of defining the spatial qualities and spatial relations of external objects is dependent upon a previous experience of sensation-complexes of motion.*

Experiments to determine the "sense of locality" belonging to different areas of the skin began with E. H. Weber's classical discovery. By using the two points of a pair of compasses, so covered as to avoid the sensation of being pricked, he found that when these points were separated 1 mm. on the tip of the tongue, and 2 mm. on the volar side of the last phalanx of the finger, they could be discriminated as two: a separation of 68 mm. was, however, necessary for the same act of discrimination on the middle of the back. This variation cannot be due to fixed degrees of original sensitiveness to stimuli in the physical organ. For it may be reduced by practice; and practice on one side of the body increases the power of discrimination for the corresponding parts of the other side. Speaking figuratively, the "sensation-circles" of the different areas of the skin vary greatly; and the discriminating sensibility of this organ is in the inverse ratio of the size of these circles for its different areas.

The nature of the sensations of position which develop in the use of the eye is much more obscure. It has been long known that stars not more than 70″–30″ apart can be discerned as separate by the best observers; but for other observers the *minimum visibile* is much larger. Now since this distance corresponds pretty well with the calculated breadth of the cones in the "yellow-spot" of the retina, it has been assumed that visual sensations of position are independent of the motion of the eye. Here, however, the psychologist cannot neglect the significance of the fact that visual experience is never, from the earliest dawn of consciousness, with a motionless and passive retina. From the first, the eye is in ceaseless action. And experiment seems to show that movements of the muscles, even so exceedingly minute as to correspond with the *minimum visibile*, have a modifying effect upon visual sense-consciousness.

We conclude then, that apparently, *our light- and color-sensations are localized by means of varying mixtures of sensuous elements derived from stimulation of different areas of the retina and accompanying muscular and tactual sensations of the moving eye-ball.*

Influence of Attention. — It is most important to notice that our sensation-complexes, both of motion and of position, are brought into clear consciousness only by an act of attention. Suppose we ask ourselves for a definite answer to the question: Whereabouts on the field of my eye or skin is the stimulus applied; or in just what position has the organ been passively placed? Such a question is itself a proposal to examine and see. The very proposal to direct attention produces important changes in the sensory condition of the organ. It alters the capillary circulation and throws the muscles into a condition of tension. Hence it comes about that *no peripheral area can be stimulated without the resulting sensation-complex absorbing into itself the result of the motor changes or tendencies to change brought about by the attention directed to this same sensation-complex.* This principle of the absorption of the products of attention into the sensation-complex must never be neglected.

Sensation-Complexes as "Local Signs." — We are now ready to see the bearing of this enormous variety of nicely graded mixtures of sensation upon our scientific study of perception by the senses. It is not fair, of course, secretly to convert these mixtures of *our* sensations into qualities and relations of *external* objects. The development of intellect, according to its own laws, will have to give us the fuller account of this process of "converting" — if we may use, for the moment, so ambiguous a term. We may see, however, what a system of sense-experiences is provided, and how it is fitted to lend itself to the mind's discriminating and interpretative activity. Or, rather, we may see what a vast differentiation of our sense-experience may be systematized by the interpreting work of discriminating consciousness.

The theory of "local signs" depends upon the following apparently well-established fact: *The total compound characteristic of every distinguishable mixture of sensations changes with the locality of the organ where the excitement occasioning that particular mixture originates.* Thus these mixtures are able to "signify" the different positions and motions which our bodies and external objects may assume or undergo. The limit of the differentiation of these mixtures is the limit of our ability to discriminate differences of locality, and so differences in the size, shape, and space-relations of things.

Even an unskilled analysis illustrates and enforces the existence and usefulness of so-called "local signs." Let any one rub gently together the tips of the two corresponding fingers, and attend strictly to the series of sensation-complexes thus produced. If the finger (**F**^{r}) of the right hand differs greatly in the texture of its tip from the corresponding finger on the left hand (**F**^{l}), — if, for example, **F**^{r} has not, and **F**^{l} has, a callous spot — then the sensation-complexes of the two fingers will be easily distinguishable, as such. But if the two fingers are alike in texture, the sensation-complexes corresponding to the two may be indistinguishable in respect of their compound quality. The results in perception will be as follows: **F**^{l}, having the callous spot, on being lightly pressed against **F**^{r}, will appear as a foreign body being touched. But if sensation-complexes **F**^{l} = **F**^{r}, then either finger may be regarded as touching the other, or as being touched. Yet, again in this case, by moving either finger we can easily compel ourselves to regard $\mathbf{F}^l$ as touching $\mathbf{F}^r$, or $\mathbf{F}^r$ as touching $\mathbf{F}^l$. The moving finger is touching; the finger held still is being touched.

It accords, too, with the theory of local signs that Binet, following Weber's experiments, though with important modifications, comes to these conclusions: (1) "The sensations provoked by the two points of the compasses are of different quality when the subject perceives the two points; (2) the sensations provoked by the two points of the compasses are of the same quality when the subject perceives a single point."

General View of Perception by the Senses

Principles of all Development of Sense-Perception. — It follows from our entire study of the facts that the knowledge of extended and external objects is a development. This is as true of that kind of knowledge which is called *perception*, and which appears to be immediate and "face-to-face," as it is of our knowledge *about* things, or our scientific knowledge. But the conditions and laws of the two kinds of knowledge are not the same. For example, the knowledge that the water in this tumbler is, chemically considered, H_2O, or that it has such a standard specific gravity, differs greatly, in its character and grounds, from the knowledge gained by looking at and lifting this particular tumbler of water. Just now, however, it is of this perceptive knowledge that we wish to maintain: It, too, is the result of a development. The theory of sense-perception is scarcely more than a history of the development of sense-perception. Proof and illustration will, then, occupy us through the remainder of the chapter. But it is well to precede this more detailed examination by clearer recognition of three important points.

(1) There is no complete break anywhere in the development of sense-perception. The principle of continuity applies here. Yet important stages may, for theoretical

purposes, be recognized. In the evolution of the chick, the continuity of process is to be emphasized; but hatching is an important event for the growing bird. So there is no marked time when the infant — to speak figuratively — gets consciously out of its own shell of sensation-complexes, whether "of motion," or "of position," into a world of external objects. No voice, as of a trumpet, announces the arrival of a clear consciousness of the extension and externality of things. The same powers of an attentive and discriminating consciousness are immanent in the sense-experience from the first. The "fusion" and "complexity" of those theoretical factors, which the psychologist assumes, — namely, the simple, unlocalized sensations, — is an accomplished fact from the beginning.

(2) Two principal stages in the construction of presentations of sense may, roughly speaking, be recognized. These are sometimes called "localization" and "projection" — or "eccentric projection," although there are many objections to the use of these figurative terms. One stage concerns the growth of discrimination as to the different areas of the bodily organism, especially in their relations to each other. In it the child is employed in "getting acquainted with its own body," in learning how the different members feel and look under every variety of possible positions and motions. In the other stage discrimination is busy with the different relations of things to the body, and with the different space-qualities and relations of things to each other in space.

Not to anticipate too minutely, it is enough at present to say that neither of the two growths of the perceptive process can proceed without involving the other. Neither of them can proceed without also involving a correlated development of the knowledge of Self. I localize the thing as "here" or "there," in relation to my-*self* — meaning by this latter word, my sentient body. But I come to form the conception of an inner circle of self-hood, as it were, to which I regard the different parts of my own body as external, and in relation to which, as a centre of perceiving activity, I perceive both things and bodily members in a system of localized objects.

(3) In the complicated history of the development of sense-perception, certain senses have a part far more prominent than that which can be assigned to the others. It is our sense-experience gained through the eyes, and through the skin, muscles, and joints, which gives the "face-to-face" knowledge of things as "out" and "spread out" of ourselves. Perception, as "the immediate awareness" of external and extended objects, comes primarily by Sight and Touch alone. The other senses give secondary and more inferential knowledge of the qualities of objects, as those objects have already been perceived by sight and touch. The red-colored extensions, with their velvety "feel," which I hold in my hand, *are* the rose; the smell which I localize, as also "felt" in the areas of my nostrils, is the smell *of* the rose.

The so-called "Spatial Senses." — The truth just stated is so necessary for understanding the development of perception by the senses as to need further consideration. All detailed study of the perceptions of the different senses will illustrate it. The spatial qualities and spatial relations of things *are* made known to us by sight and touch — using this latter word to include sensations of the muscles and joints, as well as of the skin. Such qualities and relations *are not* made known to us by smell and taste, exclusive of touch. The negative statement applies less obviously to hearing; still, it does apply to hearing also.

If inquiry be made into this preëminence of these two kinds of our sense-experience over the other kinds, the three following reasons may be given for it. These reasons have chiefly to do with *the character of the sensation-*

complexes excited successively by the stimulation of the different localities of the organs of sense. Only the eye and the skin (including muscles and joints) are capable of giving rise to "spatial series" of sensation-complexes.

More especially, (1) *Spatial series* of sensations possess a system of local signs, as non-spatial series do not. Smells, tastes, and tones, as such, are not variable in such a manner as definitely to "signify" the locality of the organs in the excitement of which they originate. (2) Spatial series admit of easy, frequent, and rapid repetition, in varying order of arrangement, as non-spatial series do not. Thus, we shall see that sensations of the eye, and of the skin, muscles, and joints, run through graded series that may be repeated in a variety of directions; while those of the organs of taste and smell do not. (3) Two spatial series of sensation-complexes, when experienced simultaneously, or in close succession, are comparable and associable with each other. Non-spatial series are not to the same extent comparable and associable with each other. In the case of hearing, however, the graded series of sounds is such as to be comparable and associable with the muscular and tactual sensations awakened by listening to the sounds. Thus the ear stands, in some sort, midway between the more definitely spatial and the most completely non-spatial senses.

"Nativist" and "Empiricist" Views. — There are certain questions connected with the development of perception by the senses which it is difficult, or impossible, to answer fully. Any answer, whether an affirmative or a negative answer, fails of establishing itself upon a perfectly firm basis either of introspection, or of memory, or of experiment. Such are some of the questions in debate between the different theories of perception.

Our analysis of the sense data, however, enables us to reply, with considerable confidence, to the following three important inquiries. (1) Do sensation-complexes which include no motor elements ever possess *primarily* — that is, without fusion or association with sensations of motion or of position due to previous experience of motion — the attribute of extensity? To this question we have already given in part our reasons for a negative answer. (2) Have the most primitive sensations of light and color — the shades which might be produced by moving the object over the field of a perfectly motionless eye — the attribute of extensity? Here, again, though not so positively, we are inclined to a negative answer. Discriminating consciousness, as practised with a moving eye, is necessary to the vaguest perception of "bigness" as belonging to visual sensation-complexes. But then we have this practice with a moving eye from the very dawn of consciousness, in the case of all normal infants. (3) Is the perception of the size and contour of motionless objects, when in contact with the skin, dependent upon the images of past sensations of muscular and tactual sort, acquired with motion of the organs? This question, too, should be answered in accordance with the same view of the functions of the sensory-motor mechanism: It is thus dependent.

All perception of extended and external objects is, then, acquired as a matter of growing experience. Thus far our conclusion agrees with the empiricist. *But no perception of external and extended objects is the mere result of the fusion and association of sensations.* From the start, the psychologist is obliged to recognize the activity of discriminating consciousness, at work according to laws of mental life. In other words, the "native" character of mind shows itself in constituting its own sense-experience as a system of interrelated objects, external and extended in space. This conclusion accords with the nativistic position.

By a "nativist" is ordinarily understood one who assumes the cognition of the spatial qualities and relations of objects as due to a *native* power of the mind; he, therefore, denies that any analysis of experience can account for that which, as he holds, the mind does not acquire by experience. By an "empiricist," on the other hand, is generally understood one who holds that the perception of space-qualities and space-relations is acquired; he denies that we have any right to speak of a native "intuition" of space. As extreme, old-fashioned nativists may be instanced the Scottish School; they, on the basis of the testimony of crude, unanalyzed, adult consciousness, taught that all kinds of sensations are from the first intuitively known as external and extended objects. A modified, scientific nativism, of a carefully limited character and based upon a searching analysis of sense-consciousness, has been held by writers like Stumpf in Germany, Ward in England, and James in this country. These writers attribute "extensity," or primordial "bigness," to all sensations as such. Professor James also holds that movement is not necessary to space-consciousness, but only renders it more definite.

Our position differs from both classes of writers just referred to, but agrees in the main with a considerable number of the best authorities. With Professor Sully we hold that, "whatever the precise nature of this primitive 'massiveness,' it seems reasonable to conclude that it requires the incorporation of motor ideas before it becomes *spatial*, as we understand the term." More decidedly: *We hold unequivocally that perception without motor consciousness is impossible.* Finally, we hold that to speak of the "extensity," as distinguished from the intensity of smells, tastes, sounds, as such, is absurd. On the other hand, we admit that no theory of perception is adequate which recognizes *merely* the fusion and association of sensation-complexes under the principles of habit, of contiguity, and of similarity or contrast. *A constructive intellectual activity must also be recognized.* And the constitutional forms of this activity, which the most searching and thorough analysis is compelled to admit, may fitly be spoken of as "*native*" to the Mind.

We may, therefore, now declare, what will be at once proved and illustrated in detail by a consideration of the perceptions gained by the different senses, namely: —

A Summary of the General Conditions of Sense-Perception. — *Two or more series of sensation-complexes, having the characteristics of "spatial series," and belonging to the* *same or to different organs of sense, occur simultaneously or in immediate succession; they are frequently repeated in this close conjunction in consciousness, and become associated with conative impulses that result in movements of accommodation; representative images and traces of conative impulse due to this frequent repetition, are combined with, and habitually suggested by, similar sensation-complexes in every new experience; feelings of interest, expectation, etc., become the habitual affective accompaniments of this complicated "mass" of sensation- and ideation-elements; and discriminating and relating consciousness is ever active (comparing, assimilating, differentiating) to accomplish the higher unifying processes which are necessary to the cognition of all objects of sense.*

But — it may be inquired with astonishment — does the infant begin to accomplish all this complicated product of a psychical mechanism? And is the plain man's consciousness to be accused of such intricate performances in the way of practical mastery of things by use of the senses in his daily life? To such questions the scientific student of mental development is obliged to answer, "*Yes*"; — and with emphasis. For all that his science can disentangle from the web of conditions which surrounds the perfected sense-perceptions of the average mind is but a broken and imperfect picture of the actual achievement. In this respect, his problems and his success in solving them, resemble the experience of his colleague, the biologist, who is studying the process of building the organism correlated with this psychical development.

It should also be noted that, in the development of perception by the senses, any original resemblance to a passive copying process becomes constantly more remote. For, first, the relative amount of sensation-complexes that have a genuine peripheral origin becomes smaller; the relative amount of the complex processes due to revived ideas, and to rapid judgments habitually performed, becomes greater. Physiologically expressed: perception grows more *brainy*. Psychologically expressed: perception becomes more a matter of *ideation* and of "*impulsive*" *inference* (if we may provisionally be allowed such a term). But, second, the development of practical and theoretical interest in making careful discriminations, and of power to make them, results in increasing the variety in content of the sensation-complexes. Things are taken less "in the lump," as it were.

Therefore, increase in the wealth of sensuous details and a higher ideal and intellectual quality, both belong to the more developed sense-perceptions.

DEVELOPMENT OF SENSE-PERCEPTION BY THE DIFFERENT SENSES

We consider, first, the case of the "non-spatial" senses, or those which, *of themselves*, could give us no perceptions of external and extended objects — namely, Smell, Taste, and Hearing.

Perceptions of Smell and Taste. — A certain knowledge of things outside of our bodies, and of the masses and movements of our own bodily organs, comes through the nose, and the tongue, roof of the mouth, and soft palate. This knowledge is not, however, due to the localization of olfactory or gustatory sensation-complexes, as such. Smell and taste, properly speaking, have no such system of "local signs" as lend themselves to the development of the "immediate awareness" of external and extended objects (comp. p. 183 f.). They are localized only indirectly, on account of their connection with tactual and muscular sensations. It is drawing the air over the nostrils, by the active process called "sniffing," and rolling the tastable substances about in the mouth while they are pressing against its surfaces, that makes *objective* our various smells and tastes. The smell and the taste of anything are qualities attributed to it by a system of secondary and doubtful inferences, but only in case it has already been constructed as a thing in terms of sight and touch.

Nice perceptive distinctions in the smells and tastes of objects do not tell us anything directly about the spatial qualities or relations of those objects. Hence they are chiefly of biological or æsthetical value. They give information as to the probable salubrious character of objects; they quicken or depress our vital energies; they please or disgust us. But they never directly inform us how large things are, or what shape things have; it is only by their varying intensities and qualities that we are able indirectly to assign them to the things whose smell and taste they are.

It is interesting to observe how the less intellectual men and races are often most discriminating in the use of these senses. Haller narrates that the negroes of the Antilles can distinguish by smell the footsteps of a native from those of a Frenchman. Humboldt affirms that the Peruvian Indians know the smells peculiar to different races of strangers. With this might be compared the claim of the Roman epicures to detect by taste the leg on which the partridge had slept the night before being killed. Hypnotic subjects sometimes develop such an astonishing acuteness of olfactory sense as to distinguish the specific odor of the objects belonging to a number of different persons, and to assign to each one his own. This is more like an animal "cunning" than like the intellectually developed perceptions of the average adult man.

Perceptions of Hearing. — The case of those perceptions of extended and external things which are gained by hearing is not so obvious. No one would think, however, of affirming that auditory sensations make us immediately aware, in any distinct way, of the size and shape of things. If we know certain portions of our own bodies as the more or less extended "seats" of the affection, it is plainly because these portions are *felt* to be set into vibration, or pressed upon, or in a condition of muscular tension. On the other hand, most sounds are, apparently at once, located somewhere outside of our bodies, and are situated in a certain direction, and at a certain distance, from us. They are also perceived as the sounds "of" this or that particular object, — of a striking clock, a passing carriage, a friend's voice, etc. The knowledge of the kind of object from which the sound emanates is indisputably the result of previous experience, which has given to our eye or to our hand that particular sort of an object as responsible, so to speak, for that particular sort of sound. The inquiry is, then, narrowed to this: How do we come to perceive sounds as external and as having a particular direction and distance?

To the question just raised, the analytic treatment of ordinary experience and of experimental data gives the following probable answer: (1) It is by means of their variable complex qualifications, especially by their intensities, and as fused with sensations and images of motion and tension, that sounds are localized; but (2) they are localized in a space already constructed by the eye and by skin, muscles, and joints.

Among the local signs of a tactual and muscular sort are the sensations caused by moving the eyes and head, primarily in a tentative way, so as to see and face the sounding object. Sensations of tension or strain, which vary according as, in the effort to hear, we direct attention to the right or to the left, in front or behind, also serve as *indiciæ*. Possibly, also, yet more obscure sensations connected with the vibrations of the ear drums and the semicircular canals assist in the localization of sounds. When this space, in which the ear sets its sensations, is spoken of as "already constructed," it is not, of course, meant that the ear waits for the spatial organs to develop a complete system of space-perceptions, before it hears sounds as external and in this or that direction. But hearing is constantly led by the spatial senses, and is dependent upon them for all its achievements in localization.

As to the distances at which familiar sounds are localized, there is no difficulty in recognizing the simple principle. Their varying intensities as compared with the memory-images of what may be expected at an assumed distance, serve as "local signs." In dreams an insignificant crackling in the ears is heard as a cannonading or as a series of thunderbolts. The chorus at the opera make the impression of retreating to an immense distance by softening their voices; and the oratorio lets us hear the celestial choir by a similar device.

Recent experiments (by Mr. Matsumoto, in the Yale Psychological Laboratory) appear to establish, beyond doubt, the fact that the relative intensity of the sounds in the two ears is a chief means for localizing their direction. For if a person is placed in a chair, blindfold and mid-way between two stationary telephones of similar quality, then the one sound which he hears may be made to pass from side to side, around in front or back of the head, or even through the head, by varying the difference of the intensities of the two components. And the accuracy of localization appears to agree fairly well with the difference in these intensities. Possibly additional evidence comes from a number of cases where those suffering with anæsthesia of the skin of the external meatus and tympanum have been quite unable to tell even on which side of the ear the sound was.

Perceptions of Touch in General. — To avoid useless repetition, we shall now regard the term "perceptions of touch" as including all that seemingly immediate awareness of external and extended objects which comes through the organs of skin, muscles, and joints, whether these organs are in movement or at rest. For purposes of convenience we shall also make a somewhat abrupt separation between perceptions gained in this way, of the bodily organs themselves, and perceptions of things external to the bodily organs. That both these classes of perceptions belong to adult experience admits of no doubt. Grown people know by touch and sight, with more or less of definiteness, the smaller areas and larger masses of their own bodies. But grown people also know the space qualities and space relations of things external to the body, by the same organs of sense.

In the actual development of sense-perception by touch, the knowledge of one's own body and the knowledge of other bodies are interdependent. The origin and early growths of these two classes of touch-perceptions cannot be considered apart. But in the later life, the perceptions of the relative positions and movements of the bodily members drop out of consciousness to a large extent. This is because we forget to notice *how the different parts of the body feel*, our practical interests being best served by concentrating attention on *how things actually are*, as related in space to one another and to our own bodies.

The acquirement of perceptions of touch relating to our own bodies will first be briefly traced. It must not be forgotten, however, that this treatment compels the separation in description of what is not separated in experience.

Touch-Perceptions of the Movements of Parts of the Body. — The movements of the newly-born infant are reflex and automatic or impulsive. They are not so much *by* discriminating consciousness as *for* it. But however occasioned, all these early movements result in certain series of sensation-complexes being run through in consciousness which are due to the concurrent excitement of the skin, the muscles, and the joints. In the case, too, of the most important of the moving organs, the effect of sight must be taken into account. But confining the present discussion to perceptions of touch, it is plain that the repeated movement of any member of the body results in "weaving together," as it were, two or more spatial series of those sensation-complexes which are necessarily run through in accomplishing that particular movement. For example, the infant's arm cannot be even passively moved when it is awake, without producing series of changes in the sensation-complexes of its skin, muscles, and joints. On repetition of the movement through the same arc, the revived mental images of its earlier sense-experience fuse with the freshly awaked series of sensation-complexes. Such a "sensation-mass," fused with these ideation-products, and accompanied by affective and conative elements, *is the moving arm of the infant so far as it is perceived in terms of touch.*

Let **A** be the limb in movement from **X** to **Z**, and s, m, and j (skin, muscles, joints) the three kinds of sensations evoked. Then by repetition a fusion takes place between the series (s, s_1, s_2, s_3, *etc.*), (m, m_1, m_2, m_3, *etc.*) and (j, j_1, j_2, j_3, *etc.*). Thus by the principle of condensation of series (see p. 142 f.), and in accordance with the laws which govern the particular associations (see p. 144 f.), one position (**Y**) of **A** will be characterized by ($s_2 + m_2 + j_2$), fused with primary images of (s_1 and $s + m_1$ and $m + j_1$ and j), just fading out of consciousness, and reviving images, with a stirring feeling of expectation, corresponding to ($s_3 + m_3 + j_3$, *etc.*). What is true of this one position (**Y**) will be true of every other, such as **L**, **M**, **N**, etc.

Touch-Perceptions of the Positions of Parts of the Body. — It has already been shown that sensations of position are secondary and are dependent upon previous experience with sensations of motion. The same thing is true of the relation between perceptions of positions and perceptions of movement. Two important differences characterize these two kinds of touch-perceptions: (1) Since any part of the body, when at rest, must either be *held* in position by its own muscles, or *supported* in position by some external thing or other bodily member, the passive sensations of pressure are more prominent in our perceptions of position. In the special case, however, where one part of the body supports another part, there are two "sensation-masses" which invite discriminating attention. These correspond, respectively, to the perceptions of "supporting" and "being supported," or "resting upon." But

(2) in the perception of the position at rest of the movable members of the body, we are much more dependent upon the accuracy of our memory-images. Experiment shows that localization is more inaccurate under these conditions. And the experience through which one goes in being the subject of experiment reveals the effort to imagine how the limb *would feel*, if only we could move it, or could define its position by moving some other part of the body over it.

We now see how the sensation-elements for the perception of position are marked off from those for the perception of movement. *The immediate awareness of the position of the movable members of the body is largely a system of associated ideas due to previous movements.*

Vagueness of First Bodily Perceptions by Touch. — The earliest perception of our own bodies by touch consists of a vague discrimination of those members which move most frequently, and whose movements have a strong emotional tone. As rivals in this form of early sense-consciousness may be mentioned such bodily parts as are more frequently pressed upon or stroked, and which also thereupon feel most of pleasure or pain. To the first class belong the active arms and legs; to the second class, the more passive but sensitive abdomen, back, and face. Confused and crude sensation-masses corresponding to these bodily members probably constitute the total touch- and muscle-percept of its body for the very young child. The adult may produce the nearest representation of these early touch-perceptions by directing attention solely to the localized sensation-masses, which afford all the "immediate awareness" he has of his own bodily members as *felt* existences for himself. In conducting such an experiment, nothing is more suggestive of true theory than the "life-likeness" which is put into each particular perception when the bodily member is moved, and attention is clearly directed to the resulting modification of sense-consciousness.

Division of the Bodily Perception-"Mass." — Finer discriminations of locality upon the surfaces of the skin are the later achievements of attentive consciousness. The data for such discriminations are the sensation-complexes interpreted as local signs, in a manner already described (p. 179 f.). Prompt and accurate localization of a "where-one-is-hit," does not come by any means at first. The crying infant, even if it could speak, could not tell the place of the pin sticking into its flesh. Even adult discriminations of this sort are rather inexact for most persons, and are capable of large improvement under practice for all. But the adult has a relatively detailed and precise *visual* picture of most of the bodily surfaces, into which he can set, at nearly the correct place, his sensations of touch. The infant, on the contrary, has no picture — either tactual or visual — into which it can set its pain.

Two principles chiefly govern the breaking-up of this "gross mass" of sensation-complexes of touch. (1) *Intellectual development is concerned in, and is gained by, all active analysis.* The infant cannot map out its tactile and muscular body without attaining a considerable growth in discriminating consciousness. It grows in power of discrimination by the continuous and successful effort to master the perception of its own body,— by the study of its own body's geography. But (2) sensations of motion precede and lead sensations of position in respect of effectiveness. If, for example, one of the two points of a pair of dividers be prepared so that it can be given a rotary motion, suddenly rotating it will almost always make the points seem two, when just previously they have been perceived as a single impression. In general, *it is the discriminable difference between two most nearly alike sen-*

sation-complexes, as derived by motion over the skin, which sets the extreme limit to our tactile perception.

The great value of those means for locating the minuter sensation-areas of the skin which are derived from their tendency, when stimulated, to motor reactions, accords with the same principle. The crawling of an insect makes the skin creep or shudder, and calls out a tendency in the hand to reach and examine the offended spot. These associated feelings and conative impulses become important aids in the refinement and increased accuracy and promptness of this form of localization.

Orienting of the Body in Space. — The perception of the mutual relations of the different principal masses of the body, and of the entire body to surrounding objects in space, is a much more complex affair. It is not ordinarily a matter solely, or even chiefly, of the skin, muscles, and joints. The feelings of pressure of one part of the body upon the contiguous parts, of the movements of part over part, and of the swaying, rolling, and settling, etc. — especially of the internal and less fixed masses, — all afford data for this complex perception. But in the case of all persons not born blind, a previous construction of space and of spatial relations by the eye is to be assumed.

In all the complex work of orienting our body in relation to external objects, the position assumed by the head is of the greatest importance. The sensations which determine our perception of this position, as a sort of place of standing from which to perceive the relations of all other things, including the other members of the body itself, are in part very obscure. Experiment seems clearly to show that some of them are dependent upon the changes which go on in the pressure of the fluids within the semicircular canals of the ear.

Perception of Other Bodies by Touch. — In accounting for the perception of our own bodily members by touch we have already given the partial account of our touch-perception of other bodies. For whenever these members are presented to us by touch, our perception of them implies discrimination between two "sensation-masses," or series of sensation-complexes. These two correspond to (a) some member of the body touching, and (b) some other member of the body being touched. What is still necessary is some means for a discrimination which shall correspond to (a′) some member of the body touching a thing and (b′) some body of a thing, that is not my body, being touched.

This further work of discrimination prepares the way for that achievement of a "diremptive" character which sets the Self over against a world of external and extended Things. It is made possible by two classes of data: (1) Certain spatial series combine, with a marked accompaniment of feeling vividly colored by pleasure-pains; but other series are relatively toneless in respect of pleasure-pains. (2) Certain spatial series are connected with our conation and conscious self-activity in a markedly different way from other spatial series. In general, *the discrimination of our own body from other things is mainly dependent upon relations to our feeling and will.*

First Vague Perception of Other Bodies by Touch. — Undoubtedly the infant first perceives external objects in the same vague way in which it perceives the different parts of its own body. In the perception of things it is sight which is, from the first, most influential. But the process of discriminating its own body, as known to touch, from other things is made possible, and even compelled, by its varied experience with either free and comparatively tone-less movements or resisted and feeling-full movements. Spatial series of sensation-complexes that are habitually accompanied by pleasurable or painful feeling are perceived as parts of its own body; other spatial series, not thus accompanied with pleasure-pains, are perceived as external objects. The infant feels its own body in an interior, and pleasurable or painful way. It feels things more coolly and objectively. Spatial series of sensation-complexes that are dependently connected with volitions are perceived as movable members of the body; other series not thus dependent are perceived as bodies separate from our own and as opposed to the voluntary movements of our own body and of its members.

For example, let **A** (the arm) on moving from **X** to **Z** develop a series of complex sensations = $(s, s_1, s_2, s_3,$ etc.), $(m, m_1, m_2, m_3,$ etc.), $(j, j_1, j_2, j_3,$ etc.) (comp. p. 193). Now let this series be interrupted at a certain point $(s_2 + m_2 + j_2)$, and another series tinged by intense feelings of effort or pain take its place. The *new* series consists of skin-sensations produced by striking against some thing (s^x), of muscles brought to arrest in a state of tension (m^x), and of joints compressed (j^x). Moreover, the young animal, when resisted, impulsively reacts with increased conation. This appearance of an abruptly changed "sensation-mass" in consciousness $(s^x + m^x + j^x)$, with its wholly altered accompaniment of feeling and conation, is an irresistible challenge to attention. Until further differentiated it may be described as a vague awareness of having the smooth flow of sense-experience interrupted in a manner which hurts, but over which I have no immediate control.

The gripping of the infant by mother or nurse, the contact with its warm bath or cold bed, the movable *bolus* in its throat, the blows it gives itself with fist or leg (in which case it gets hurt in two places, with different degrees and qualities of painful sensations), — all such experiences furnish it with data for making the first vague distinctions between its own body and other things. So far as these distinctions, thus gained, are confined solely to terms of touch, they remain exceedingly vague and localized, "in the lump," as it were.

Finer Perceptions of Bodies by Touch. — Such vague differentiation as has just been described is made clear and precise by the explorations of active touch. Here the hand and fingers are the chief organs of perception. Their use in running over the surfaces or along the edges of different bodies results in two varied but interpenetrating series of tactual and muscular sensations. One of these series corresponds to the perception of touching and the other to the perception of something touched. If any object is simply pressed against the skin, the perception of its size and shape is relatively inaccurate. Weber, indeed, found that the circular form of a tube $1\frac{1}{2}$ Parisian line in diameter could be distinguished on the tongue, while it required a size of $3\frac{3}{4}$ inches to make the same distinction on the skin of the abdomen. But the tongue, like the tips of the fingers, is not only most sensitive to differentiations in tactual sensations, but is also a ceaselessly movable organ of touch. How badly deceived it may be, however, when unable to call in the aid of sight, its estimate of the cavity left by a newly drawn tooth makes obvious. The blind rarely, or never, attempt to measure surfaces accurately otherwise than by running the finger along the boundary lines. *It is the mobile organ which carefully delimits its object.*

Superficial Qualities of Bodies by Touch. — Bodies are known as "rough" or "smooth" to touch by the character of the sensation-complexes produced when moving some tactile organ (preferably the hand) over them, or when moving them over some organ. "Hardness" and "softness" require that *emphasis* be given to tactual and muscular sensations by the moving member being resisted. Temperature sensations, too, have no small influence on the perceptions called forth by bodies in contact with the surfaces of our body. The weight of the same thing appears to change with its temperature, although the results as bearing on the character of the change are somewhat conflicting. The smoothness of polished marble is partly due to its appearing cold. Both pressure and temperature sensations combine in the perception of "moist" and "dry" surfaces, and in all cases where different degrees of "friction" and "sticktion" are involved.

Perception of Solidity by Touch. — There is abundant evidence to show that, were it not for resisted movements, no world of solid and real things could come into existence for the mind. The perception of the solidity of bodies, and of the various modifications of this general quality, therefore involves that peculiar emotional and conative coloring of the stream of consciousness which accompanies intense tactual, muscular, and joint sensations. In a word, *we perceive other bodies as having weight, impenetrability, inertia, etc., by comparing together spatial series of sensation-complexes that are, chiefly, wide-spreading and strong tactual, muscular, and joint sensations, fused with intense feelings of effort and with other emotional modifications, due to superinduced tension of the organs involved.* Among these "organs involved" are the internal organs of circulation and of respiration, — especially in all cases of great exertion on our own part.

Here again the influence of *motor* sensations and of mental images of *motor* sensations is most important. Memory-images of our past experiences when trying to move heavy bodies are the most influential factors in determining all new perceptions of this order. Thus bodies that move easier than we expected are perceived lighter than they are; bodies that make an unexpected resistance to our muscles are perceived heavier than they are. To these same principles we shall have occasion to refer when treating of illusions and hallucinations.

On making the transition from touch to sight we seem to have come into a wholly new realm of knowledge. How meagre and fragmentary is the picture even of our own bodies as gained purely by the "feelings" which arise in skin, muscles, and joints! How relatively poor in content the perceptive cognition of the world of things which it is given to the blind to enjoy! Yet the same mind, obeying the same laws, develops both classes of perceptions.

Classes of Sensation-Complexes concerned in Vision. — Nothing can be more erroneous than to suppose that vision is a mysterious "copying-off" process which ready-made things somehow effect upon the brain or the retina of the eye. It is the rather a *mental achievement*, which involves the growth of discriminating intellectual life dealing with a complicated variety of "sensation-data," so to speak. Among such data are the following: (*a*) Sensation-complexes of light and color, of varying qualities and intensities, due to simultaneous excitement of contiguous nervous elements of the retina; (*b*) sensation-complexes of tactual and muscular order, due to movement of the eye-ball; (*c*) other sensation-complexes due to accommodation of the eye for near distances. These combine with (*d*) mental images of past sensations of all three kinds; and with (*e*) faint accompaniments of affective and conative consciousness.

Moreover, the more developed forms of visual perception involve other sensation-complexes that are localizable around the eyes, or in the neck and upper part of the trunk. Nor is the development of this form of perception without assistance from certain obscure sensations due to pressure and movement in the fluids of the semicircular canals and to the other means employed for orienting our bodies in space by touch (see p. 196 f.). For we see things in surrounding space according to our perception of the position of our own bodies, and especially of our own heads, with reference to the earth.

Stages in Visual Perception. — Various stages may be distinguished as marking the increasing complexity of that problem which is before us in the attempt to understand perception by the eye. These stages are not distinctly separable in the actual development of perceptive faculty.

But they may be considered as affording different problems, or different phases of the one problem, to the psychologist. Among them it will serve our purpose to mention the following four: (1) The conditions which determine the formation of an image on the retina with the eye at rest; (2) the single eye in motion and the influence of its movements upon visual sense-consciousness; (3) the conditions furnished by the existence and relations of the two eyes exercising their functions in common; (4) the setting of the "field of vision" thus constructed into relations with other sense-experience, especially with that furnished by touch.

Formation of the Image on the Retina. — The descriptions of visual perception given by physics and physiology make great account of the formation of the image on the retina. How this takes place, the accompanying figure (No. 12) will show with sufficient detail for our purpose. Psychology, however, accepts the physics and physiology of the eye simply as suggesting the nature of the further and quite different analysis which it is itself compelled to undertake. Regarded as an instrument, this organ may be described as *a water camera obscura, with a self-adjusting lens, and a screen composed of graded nervous elements that are sensitive to stimuli, especially in the form of photo-chemical changes.*

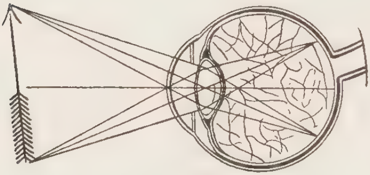

Fig. 12

It is only when the series of modifications in sensation-consciousness produced by stimulating the different elements of the retina is considered, that the *psychological* theory of vision is introduced. In the first attempts to construct such a theory two things must be kept in mind: (1) The light- and color-sensations called forth by stimulating the contiguous and successive parts of the retinal area possess those characteristics which have already been referred to as belonging to a so-called spatial series (see p. 184). They admit of easy, frequent, and rapid repetition; they are adapted to fuse in a "sensation-mass"; and they are comparable and associable with one another. It is, therefore, proper to regard them as forming a system of "local signs." But (2), apparently, *by themselves* (if they could ever be experienced "by themselves," as they certainly cannot), they would never afford data for even the most rude, confused, and inchoate form of visual perception. Even the ill-defined "bigness" of the sensation-mass which arises in consciousness when we close the eyes and attend to what we see in that way, is a secondary and derived affair.

Influence of Sensations of Motion upon Visual Perception. — We have already referred to the experiments of Holmgren, which showed that, on looking fixedly at very faint and fine points of light, their images seem to move constantly upward, if the eyes are somewhat elevated. The conclusion is in the line of all experience and all experiment. The most elementary space-intuition by the eye is profoundly influenced by the sensations connected with its motion. The eye — or, rather, the pair of eyes which are designed to be used as one organ — is constructed to move as the accompanying figures (Nos. 13 and 14) clearly show.

As a matter of fact, from the first appearance in consciousness of sensations of light and color, the visual sensation-mass depends, for its character and for its locality, both upon local signs of the retina and also upon the local signs of motion. The eyes of the infant are more restless even than its arms and legs. Preyer and others have observed babies of only eleven days old plainly endeavoring to fixate an object which was at first seen indirectly. Impulsive and less accurately coördinated movements exist from the first dawn of consciousness; the very structure of the eye is such as to force a constant improvement in the early efforts at coördination.

We conclude, then, that *all visual perception, even the most primitive, requires the fusion of sensation-complexes of light and color, which are discernible as "local signs" of the retina, with other sensations and images of sensations, of a tactual and muscular order, which are due to movement of the eye.*

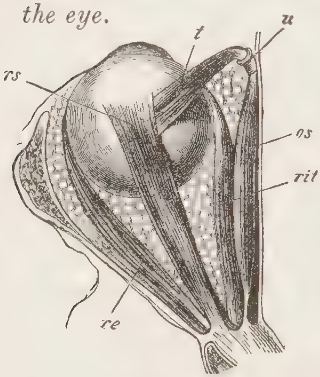

Fig. 13. — Muscles of the Left Human Eye, seen from above: *rs*, rectus superior; *rit*, rectus internus; *os*, superior oblique, with its tendon *t*, running through the pulley *u*.

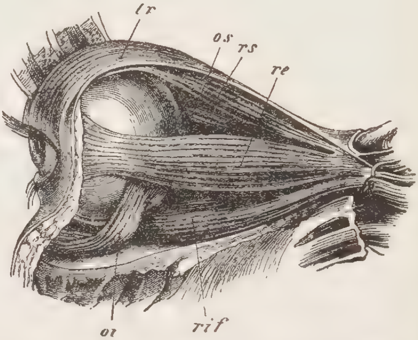

Fig. 14. — Muscles of the Left Human Eye, seen from the outside: *lr*, levator of the upper eyelid, which covers the rectus superior, *rs*; *rif*, rectus inferior; *oc*, inferior oblique; *re* and *os*, as in Fig. 13.

Construction of a Field of Vision. — In the construction of a "field" of visual perception, as in the construction of every "field" (compare p. 22 f.), discriminating consciousness is presupposed. In that experience which every adult has when, on opening his eyes, a number of objects that are external, extended, and related to one another in space, appear before him, thousands of acts of discrimination, through years of mental development, are presupposed. We propose now only to describe the data of sensation with which — to speak in a permissible figure of speech — this discriminating consciousness deals. These and the mental activity involved in vision will be better understood by noting, first of all, the obvious effect of a wandering "point of regard."

The construction of the eye is such that the image of an object is distinct only when this image falls upon a small spot in the physiological centre of the retina (the *fovea centralis*). But we are born with an irresistible tendency to bring the image to fall upon this point and to fixate it there. The infant's first impulsive movements of the eye may be spoken of as experiments in learning how to do this. The point in the object whose image falls upon the physiological centre of the retina is called the "point of regard," or the "fixation-point." Both terms are suggestive of important truth; for it is the object whose image falls just there which we *fixate* with attention, and most discriminatingly *regard*. And in that rapid but real activity of selective attention which is necessary to distinct visual perception, the eye is actually surveying the object with a wandering point of regard. It is the motor-sensations, and the sensations of position gained by its momentary pauses, which are needed in order to construct the visual field. Indeed, this fact of almost ceaseless movement can be made obvious by any mechanism which reveals and magnifies the arc through which the movement takes place.

The following conclusion is, then, reached: *Every field of vision, and every object seen in every field, chiefly depends for its spatial qualities upon changes produced in the muscular and tactual sensation-complexes by a moving "point of regard."*

When, however, the distance of any object is much changed, in order to get a distinct image of it at the point of regard it is necessary that the convexity of the lenses of the eye should be changed. This change is effected, chiefly, by relaxing the tension on the front part of the lens and allowing it to bulge out with its own elasticity. No muscular strain is involved in allowing the lens to be kept flat by the pressure of its capsule; but on approaching the object very near to the eye, the strain and the consequent fatigue required through the effort at accommodation increases. These sensations of accommodation for near distance may be made more prominent in consciousness by directing attention to them; experiment shows that they have a considerable, though somewhat indefinite, value in our perception of the distances (especially the *relative* distances) of visual objects.

The accompanying figure (No. 15) gives a schematic representation of the apparatus of the eye for accommodation. As Professor James has said, "the feeling of accommodation has no very clear and fixed value." Yet Wundt, by looking with one eye at a black thread stretched against a white background, and through an aperture in a shield, claimed to find that relative positions could be distinguished with considerable accuracy; but almost nothing could be told in this way about the absolute distance of the thread. In estimating the size of objects, too, the relaxation or increased tension of the muscle with which we accommodate may have an important bearing. Donders held that this is a chief reason why spectacles of moderate convexity magnify the object. The more recent investigations, however, seem to leave the value of the changes in accommodation still in doubt.

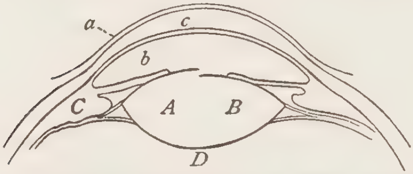

FIG. 15. — Mechanism of accommodation: *A*, the lens during accommodation with its anterior surface advanced; *B*, the lens at rest; *C*, position of the ciliary muscle; *D*, the vitreous humor; *a*, the anterior elastic lamina of cornea; *c*, corneal substance proper; *b*, posterior elastic lamina.

One other important truth is connected with the construction of any field of vision by a single moving eye. All objects which lie so far out of the points of regard as to be seen in "indirect vision" are perceived out of their actual place. For example, the retinal images of things perceived, indirectly, as straight are bent; and in order that things thus situated may be seen as straight, their images must be bent. In general, *it is only by a sort of mental transposition which we have learned to make, and which is based upon our experience with moving eyes as corrected and guided by associated images of past sensations, that the spatial relations of objects seen in indirect vision are perceived at all.*

The influence of the images associated with all the different excursions of the eye, with its wandering point of regard, appears more clearly as we consider —

The Conditions influencing Binocular Vision. — In the great majority of cases it is not with a single moving eye, but with a pair of eyes which move synchronously and more or less in correspondence, that we perceive external and extended objects. The two eyes are much more emphatically *one* organ than are the two ears. So true is this that the silly question which used to serve as a stock puzzle for the psychologist — "How can one thing be seen, by means of two images, that differ materially, upon the two eyes?" — is answered by saying: "Perception of one solid thing, under all ordinary circumstances, *is* vision with two eyes."

For the physics and physiology of binocular vision we must refer to books which treat the subject from these points of view. It is enough for our purpose to notice what modifications of sense-consciousness necessarily result from the fact that we perceive visual objects with *two moving eyes.* "Two moving eyes" implies two sets of movements and of resulting sensation-complexes of motion and of position; and two series of retinal sensations capable of apprehension as local signs. For each eye has its own point (and line and plane) of regard, and its own movements of rotation, torsion, and accommodation; each eye is a complete optical instrument. The two eyes are not optical duplicates; yet they constitute one organ of vision.

A study of the optics and physiology of binocular vision emphasizes two sets of considerations valuable for the psychologist: (1) When both eyes are motionless, it is only under very limited conditions that the images formed on the two retinas are capable of exact, or of nearly exact, super-position; (2) when both eyes are in movement, changes in the relations of their images are constantly taking place, and these changes correspond to all the positions reached along the arc of the motion of the eyes.

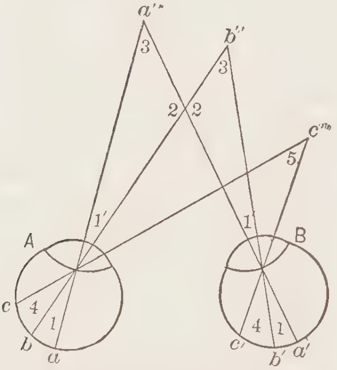

Fig. 16.—The images of objects at *a''*, *b''*, *c''*, will fall on corresponding points of the retina—*a* and *a'*, *b* and *b'*, *c* and *c'*—and will thus be seen single.

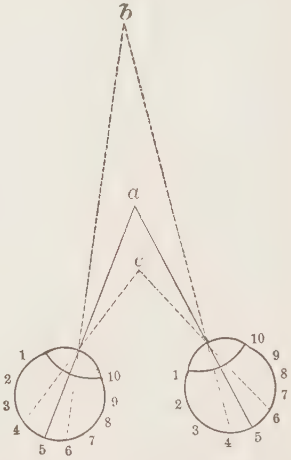

Fig. 17.—If the image of the point *b* fall in one eye on 6, and in the other on 7, the distance of the two images seen will equal that between 6 and 7. If the image of *a* fall on 5 and 5, it will be seen single; but if the image of *b* fall on the left eye at 6, and on the right eye at 4, it will appear double.

We cannot enter at length into the theory of "double images," that "correspond" or fail to correspond, of the "coupling" and "uncoupling" of double images, of the calculation of the "horopter," etc. Some of the simpler points in the theory may be understood by study of the accompanying diagrams (Figs. 16 and 17). The influence of disturbing the *customary* correspondence of the two images on the two retinas may be felt in experience by very simple experiments. If we throw them out of their customary correspondence by pressing on the eye-ball, or by an act of will, the object becomes double and loses its solidity. If we hold a finger up against the sky and look steadily beyond the finger, it is now perceived as two transparent images of a finger and not as one "real" finger. The effect of moving the eyes, upon the sensation-mass seen with closed eyes, — to make it move up or down, to the right or to the left, or to locate any minute portion of this sensation-mass, — illustrates the same truth.

Psychologically expressed, vision with two moving eyes means that two systems of spatial series of sensations — fusing, uncoupling, and fusing again — are being used by discriminating consciousness to determine the visual object as external and extended. Its size, shape, and distance (including especially its extension in the third dimension), and its spatial relations to other objects in the field of vision, are being perceived upon the basis of this double set of data. But here, as elsewhere, so skilful and rapid has the mind become in its seizure of the important data and in its relatively sure interpretation of them, that the details of the process have dropped out of consciousness. Here also, as everywhere, the extent of our scientific analysis is a poor and meagre substitute for the infinite variety of actual life.

Stereoscopic Vision. — The visual perception of things as solid is ordinarily accomplished with two eyes. The character of the complex result, so far as the perception of solidity is purely visual, is chiefly determined by the relations which the two images sustain to each other. But in order to convert this truth in optics into a truth in psychology, all that has thus far been emphasized as to the nature of perception by the senses must be borne in mind. When such stereoscopic vision occurs with both eyes at rest, or with a single eye, the influence of fused and associated ideas derived from past experience of the eyes in motion, or from the field of touch, must be allowed additional weight. Indeed, there is every reason to hold that without such past experience, genuine stereoscopic vision, or perception of solid objects with the eyes, could not take place.

Stereoscopic vision is developed, principally on a basis of variation in those sensation-complexes, concomitant or closely successive, which are due to the stimulation of the different retinal areas of the two eyes, combined with variations in muscular and tactual sensations due to their simultaneous movement.

A railroad train lighted by an electric flash (and here there can be no question of simultaneous movement of the eyes) is still seen stereoscopically. One-eyed persons appear to have a certain amount of stereoscopic vision. The object seen by such a flash-light, however, really appears to most persons more like a photograph — *suggestive* of solidity — than as a real and solid visual thing. And, in general, our stereoscopy and perspective are so obscure and inaccurate with one eye as to support rather than to oppose the view that motor-sensations with two eyes are the chief, if not the necessary, aids to all our more distinct stereoscopic vision.

The activity of the mind, and its dependence upon memory and imagination, in the construction of its perceptions of solid objects are amply illustrated by all experiments in stereoscopy. Investigations into the wandering of the point of regard, and its accompaniment of focusing and redistributing attention ("fixating"), are in evidence here. Where the two ocular images do not promptly unite in customary ways, so as to suggest, and fuse in, the right interpretation, there is apt to be a conscious pause while *we consider* the meaning of such confusion in our sensation data. An effort of will, or an involuntary spring of imagination, often settles the confusion. Thus two systems of lines on a flat surface, when uncombined, suggest solidity only doubtfully; brought a little nearer together and they combine and become more directly endowed with spatial properties. The same two sets of lines, when united stereoscopically, can be perceived either as an empty funnel or as a solid truncated cone. By uniting a right-eyed image of a white cube in outline, with a left-eyed image of a similar black cube, we are induced to perceive the transparent depths of a crystal, etc., etc.

In all such cases *it is not merely sensing, but also ideating and discriminating consciousness, which accounts for the character of the perceived object. The fact that vision is normally stereoscopic, that double vision* *does not ordinarily take place, shows that all vision involves the selection and emphasis of certain sensation-elements, the relative disregard or exclusion of others, and the interpretation of the whole in terms of previous experience as determined by habit, practice, interest in the nature of the object, expectation, etc.*

Secondary Helps to Visual Perception. — What the practiced eyes see when they open upon a landscape, or a city street, or upon the objects grouped in a room, is by no means to be accounted for completely by referring to data already discussed. Here the complex visual field consists of many objects, in front of or behind, above or below, each other, and grouped together in certain relations of contiguity, proximity, or distance, as extended in all three of the fundamental directions of space. It is this kind of seeing which makes all the objects parts of one picture and which gives æsthetical richness and variety to our visual perceptions. It is, however, dependent upon an "awareness" which is not so "immediate" as is the more primary knowledge of the eye. It involves more of judgment and imagination; the previous mental history of the perceiver enters into his vision in a more obvious and varied manner.

Among the more important secondary helps to visual perception are the following: (1) The course of its limiting lines as determining the distance and form of the object, — particularly in the third dimension. Here the bottom lines are most important; and if they cannot be discerned or correctly judged, our perception of distance is apt to be confused. (2) Mathematical perspective, or the size of the angle of vision, is also of influence. In general, objects which cover a large visual angle are perceived large. But in general, also, the perceived size of objects does not diminish nearly as rapidly as do their visual angles. Thus Martius found that if you suspend a rod of 20 cm. in length, at a distance of 50 cm., and compare with this a rod of the same length at a distance of 2.50 m., the latter will appear about 0.62–1.62 cm. longer than it should; under similar conditions the further rod, when the length of both is 100 cm., will appear as much as 7.75–9.25 cm. longer than it should. Were this rule not observed, we could not perceive square or quadrilateral things as having their sides parallel. (3) Atmosphere and (4) the size and direction of the shadows are of great influence. Painters deceive us pleasantly in this way into perceiving the background of mountains in their pictures as distant and yet large; and we deceive ourselves, sometimes unpleasantly, in the reverse way, when in Colorado we see the distant mountains as so very near. Intaglios can be converted into medallions or bas-reliefs by having their shadows reversed. The objects in the landscape look far off when the shadows begin to lengthen, etc. (5) But environment and comparison tell mightily upon the character of our visual perceptions. We cannot help seeing the actor of ordinary size as a giant when he covers so much of the distant mountain on the scene; but he is perceived as dwarfing suddenly when he advances to the front of the stage.

Effect of Imagination on Visual Perception. — That image-making enters into all our sense-perceptions, and even constitutes a part of their "immediate awareness," has already been explained. It will be made even clearer when the theory of illusions and hallucinations is touched upon. But the more remote effect of what we call imagination is most prominent in even our ordinary perceptions of sight. The truth is that the genuine "sensation-stuff" of these perceptions is customarily very slight and schematic. A few fragments of lines and patches of color are really seen; and lo! we *perceive* a tree, a man, a bird, or what not. Ordinary visual perception is a sort of "touch-and-go" affair. In it the mind seizes upon a suggestion from the conscious sensations and immediately constructs a complete picture. What really, to actual sight alone, is that man who is walking a quarter of a mile distant? Nothing more than a little blotch of color bobbing up and down in front of a green or otherwise colored background. And yet I affirm truly: I perceive — am "immediately aware" — of a man.

Effect of Feeling on Visual Perception. — That people experience what they expect, or what they want to have occur, is commonly enough said. But the influence of feeling upon all our perceptions, and especially upon the most complicated and sensitive of them all, is something more than indirect. We hear the carriage that is to convey our friend to the station, a full half-dozen times before it actually arrives. And in spite of the relatively "cool" nature of vision, feelings of dread or of gladsome expectation, of longing or of surprise, of anger or of love, often determine what mental images shall fuse with, and control the interpretation of, the visual "mass" or "series" of sensation-complexes.

Influence of Conation on Visual Perception. — From wish, or want, to *will*, is but a single step. Conative impulse and selective attention greatly influence what we see. By an act of will the microscopist can exclude the influence of images formed upon the retina of the eye which is not looking into the instrument. The trained observer, under certain circumstances, can decide whether he will or will not perceive the double images. If a card is prepared with two right-hand images of blue and two left-hand images of red, and then the four images are stereoscopically united, in some cases the volition of the observer determines which of these two colors shall be perceived, or whether the two shall mix in a binocular image of reddish-blue or of violet.

The fixation and control of the point of regard, and all that follows from this in the use of our eyes, stands for the element of will in all our visual perception.

Different Theories of Sense-Perception with the Eyes. — As might well be expected, the views of Nativist and Empiricist (see p. 184 f.) come into fiercest and most determined conflict over the case of the eye. But it is in this case that what has already been said of these views proves most obviously true. The prevalent theory in Great Britain since Berkeley has maintained the impossibility of becoming "immediately aware" of the third dimension of bodies by the use of the eyes alone; according to its conclusions, stereoscopic vision implies the translation of all visual signs of the third dimension into terms of touch. This is obviously false. For it has been shown that the organ of vision possesses, and habitually uses, a complete apparatus for becoming "immediately aware" of the solidity of external bodies, and of their relative distances. This apparatus consists, however, of the *two eyes in motion*, with the "series" and "masses" of tactual and muscular sensations, and of light and color sensations ("local signs" of the retina), which are thus evoked. When, then, the Berkeleyan hypothesis assumes that the perception of the first and second dimensions of bodies is possible without movement of the eyes, it seems to fall into equal error upon the opposite side.

On the contrary, the attempt has recently been made by a few distinguished authorities to establish a primordial "bigness" for light and color sensations as such, and to minimize or completely dispense with, the aid of motor activity in the organ. This view is equally obviously false. The most primary visual bigness is the construct of discriminating consciousness, based upon data of experience acquired with moving eyes.

The detailed discussion of the experimental data would be out of place in a brief treatise like the present. In the words of a recent writer upon one branch of the subject (Dr. Judd), "All of the results from these various experiments furnish ground for accepting the association and motor-sensation theory of visual space, rather than the contrary. . . . The sense-data presented in every case are interpreted in accordance with experience." The striking experiments of Professor Stratton in producing "vision without inversion of the retinal image" are equally unfavorable to those theories which make visual perception either a *purely* retinal, or a *purely* central, affair; and also to those which claim that visual directions are determined by *purely* muscular evidence. On the other hand, they favor the view that fusion and association of both muscular and retinal sensations determine a complicated system of "local signs" whose interpretation is dependent upon ideas gained by the entire development of our sense-experience.

Uniting and Harmonizing the Fields of Touch and of Sight. — The truth just established has an important bearing upon the union of the two great classes of perceptions of external and extended objects. The world of things *is* a world seen and felt, to which *we attribute* the production of sounds, tastes, and smells, as well as of many of our various pains and pleasures. In the full-orbed perception of things by the senses it is necessary, then, that sight and touch should unite and harmonize. Considered originally and by themselves, sensation-complexes of touch are no more *like* sensation-complexes of sight, than are either of these like sensations of taste or of smell. Nor are the various kinds of sensations which come by touch, such as those of pressure and temperature, similar in quality. But amongst sensation-complexes which are always experienced together, such a fusion early takes place as makes it difficult to disentangle them even by the most subtle and persistent analysis. This is true of temperature and pressure as entering into perceptions of touch. It is more obviously true of the motor sensations of the eye and sensations of light and color as entering into perceptions of sight.

Between perceptions of sight and perceptions of touch in general a less complete union and harmony is early effected. The constant use of hand and eye together by the infant secures the beginnings of the unifying process. What it handles, and so knows with active touch, that it examines also by sight. Thus the two classes of percepts become closely associated. The "association" rarely or never amounts to that closer and more inseparable kind of union which we have spoken of as a "fusion" of sensations and ideas. It is perhaps more consonant with experience, then, to say that one class of perceptions *suggests* the other. For example, visual volume "suggests" tactual solidity, etc. But by this it must not be understood that the suggestive process itself comes into consciousness.

For reasons which slight reflection makes obvious, touch and sight, respectively, either take the lead or are led, as best accords with the practical ends of perception. In the perception of distant objects sight is necessarily most prominent. Yet the blind have their kind of perception of such objects; and it is in terms, chiefly, of muscular sensations and memory-images of fatigue. As one of them has recently testified: "I consider infinity going away just as I would *swim away* from the land." Even for all of us the perceptive consciousness of a mountain we are about to climb, of a stone we intend to throw, of a wall we expect to jump, although mainly visual, is tinged with faint tactual, muscular, and joint sensations, with revived images of such kinds of sensation, and with feelings of effort and strain. *Per contra*, even when we are *feeling* our way in the dark, it is the memory-images of past visual experiences which blend with our perceptions of touch and, in many cases, even take the lead of them.

In general, the percept of anything which is being touched, or moved by exertion of the muscles, or which is felt in contact with the body, is modified by suggested factors of visual perceptions, of ideas and thoughts as to how that particular thing looks. On the other hand, the purest visual perceptions of distant or of strikingly colored objects are usually tinged with suggestions of how it would feel to go to them; or of how they would feel, if only we could examine them in contact with our bodies.

Thus all perception, as a seemingly "immediate awareness" of external and extended objects, in the case of persons that have used both touch and sight, implies the unifying and harmonizing of the two kinds of sense-experience. In the perception of the masses of our own bodies, whether at rest or in motion, and in the perception of the solidity, impenetrability, weight, inertia, etc., of other bodies, touch takes the lead; but suggestions of sight are blended, in subordination to the data furnished by skin, muscles, and joints. In the perception of the shape, size, and spatial relations, of distant bodies, the reverse is true. Sight leads, and suggestions of touch are subordinated. *In all cases, the practical ends of perception largely determine which spatial sense shall lead, and how the unifying and harmonizing process of construing the object shall take place.*

THEORY OF ILLUSIONS AND HALLUCINATIONS OF SENSE

All that has thus far been said about normal sense-perception, and much which will be said about memory, imagination, and reasoning, is illustrated and enforced by a study of illusions and hallucinations.

Illusions and Hallucinations in Normal Perception. — It was formerly customary to claim that our senses never deceive us; only our judgments, it was held, can go astray. Even a recent writer (James) has said that such fallacy is not "of the senses proper." It will subsequently appear — indeed, in our discussion of attention, discrimination, and the very nature of perception, it has appeared — that neither truth nor error can be claimed for "the senses proper." Only judgment can be true or false. But as to sense-perception in general, the saying of Lotze is more correct: "The whole of our apprehension of the world is one great and prolonged deception."

It is well understood by students of pathology that illusions and hallucinations of all the different senses occur in cases of insanity and other diseased conditions. Investigators within the realms of so-called "psychic phenomena" well know the influence of suggestion, in its infinitely varied forms, to produce the "immediate awareness" of all kinds of illusory objects. This influence is made especially striking in experiments with hypnotic subjects. What has not been so universally recognized is this: *In the normal waking life of the average man a large but indefinite amount of illusion and hallucination enters into all his sense-perceptions.* If we make the customary distinction and consider "illusions" as partially false interpretations of really existing sensory data (and so as having at least a partial peripheral and external origin), and "hallucinations" as purely central and imaginary constructs, we must say that both belong to the average man's so-called "normal sense-experience."

The presence of illusory elements — and often in a dominating way — within all kinds of normal perceptions is precisely what our theory of perception compels us to expect. *For all perception is interpretation; and from partial or mistaken interpretation all degrees and kinds of illusions and hallucinations result.* Ordinary experience amply confirms what correct theory suggests. Experiment also demonstrates the presence of *measurable* illusions and hallucinations in the normal life of perception by the senses. Such a series of experiments recently conducted (by Dr. Seashore; see "Studies from the Yale Psychological Laboratory," 1895) led the experimenter to the following conclusions: "What we call normal perception involves many illusory influences — not only those of physical and physiological origin, but even more so those due to the functions of ideation, memory, and imagination."

Illusions of Taste, Smell, and Hearing. — It is well known that the hypnotic subject can be made, purely by suggestion, to exhibit all the signs of having nauseating and disgusting, or delightful and invigorating, tastes and smells. Told that the glass of pure water, from which she is drinking, is ink, she can scarcely refrain from vomiting; but told that it is lemonade or wine, she not simply simulates, but actually feels, the expected refreshment or invigoration. Suppose that the experimenter, in determining "the threshold" of sensations of sweetness, having found that a $\frac{1}{2}$ per cent. or 1 per cent. solution is detected on first trial, wishes to deceive the normal subject. He can, almost without exception, make him perceive the sugar on tasting pure water the requisite number of times with the appropriate suggestions. The same experiment succeeds with the smell of oil of cloves instead of the taste of sugar. *The influence of suggestion, and the amount of the illusory factor, in the cases of the hypnotic subject and of normal perception, is only a matter of degrees.*

How people imagine all manner of sounds and of voices addressed to them, that have no accurately corresponding external stimulus, is too well known to need detailed illustration. The whole account of our dream-life, so far as it can be given in terms of audition, depends upon the influence of similar illusory and hallucinatory factors. The mother who hears her dead child calling to her may be neither more nor less truly projecting and localizing and interpreting, in an ideal way, certain sense-modifications of her consciousness, than are you and I when we converse with one another. The experiments already noticed claim to have established these two points: —

"1. Hallucinations of sound distinctly above the threshold can be produced experimentally in normal life by leading the observer to concentrate expectant attention upon the desired result.

"2. Experiments to determine the threshold of sound cannot be continued through a series of repeated trials, without being vitiated by the suggestion due to the accumulating associations."

Illusions of Touch. — The effect upon perception of crossing two fingers and feeling some small object between them was remarked as long ago as Aristotle. Only the theory of perception which recognizes it as an activity of discriminating consciousness in interpreting local signs that have become fused and associated into a fixed spatial system, accounts for even this simple experiment. But in view of this theory, the question becomes: Why should *not* this illusion take place? The illusion is, under the circumstances, the normal perception; it is the *external relations* of the different parts of the thing to the different parts of the organ which are abnormal. The mind does its duty according to its best lights. And if it were not subject to the illusion, it would not be perceiving in accordance with its best lights. But let the eye look and see how the organ and the object are related in space. Then it will correct the touch-illusion by the visual perception. Were the hand customarily to act in touch, with these two fingers crossed, then a new harmony between sight and touch would be established.

In all our perceptions of the weights of bodies which we are allowed to lift, the possible element of hallucination or illusion is large. As Dr. Scripture has said: To our sense-perception a pound of lead *is* heavier than a pound of feathers. Here, however, we are dealing with the illusory influence of one sense upon the perceptions of another sense. For if we do not perceive, or ideate, the pound of feathers in terms of sight, then it ceases to be lighter than the pound of lead. Experiment also shows that the illusory effect of the suggested idea often persists even when clear knowledge is obtained as to its presence and deceiving effect. Though we know that the smaller of two otherwise similar cylinders weighs no more than the larger, we cannot perceive them, when lifted between finger and thumb in plain sight, to have the same weight. The illusion persists, so strong are the established associations, although with diminished effect.

Illusions and Hallucinations of Sight. — Illustrations of the truth that the explanation of all cases of incorrect interpretation of the local signs (illusions or hallucinations) is to be found in the principles of normal perception are most frequent and striking in the case of sight. This is because of the very nature of visual perception. Its systems of local signs are most complex and subtilely variable, and yet most intimately fused and associated. The resulting perceptions are, of all others, the most complicated and yet firmly established. We are always attentively engaged in perceiving or ideating visual objects, as a necessary means to the attainment of our practical ends.

When an attempt is made to explain psychologically the illusions and hallucinations of sight, whether ordinary or unusual, we are often met by the fact that several principles of normal vision are needed for a complete explanation of some particular case. Hence the same sensation-data may result in different illusions in the perception of different individuals. On the contrary, the explanation of similar illusions may be different in the cases of different individuals. It is these considerations which make it so difficult to mass all the experimental data in defence of any one law of visual errors of perception. The following pages of illustrations and the accompanying text will show some of the principal applications of the general theory. The theory may now be re-stated in this figurative way: *It is the acquired fidelity of consciousness to fact and to law which produces our illusions and hallucinations; for the object is always a mental construction, a solution by discriminating and interpretative consciousness of a problem proposed in terms of sensations and of representative images.*

1. Some visual illusions are explained by the principle of *"conflict" of colors or of lines and contours.* If we place two differently colored figures on a card and then unite them with a stereoscope, one of them will be seen to "prevail" over the other (sometimes according to the will of the observer); or else the two may fuse in a third color different from both. With this strife of colors a strife of lines or of contours may be combined. If, for example, two series of outlines, one white and one black, be stereoscopically seen, we have the illusion of a transparent solid.

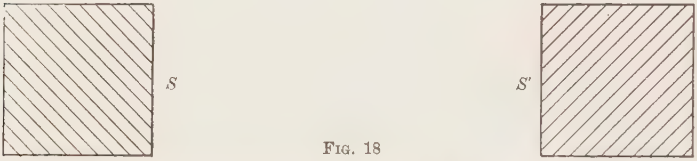

FIG. 18

Again, if two equal squares, as *S* and *S′* in Fig. 18, are filled in with cross lines running in opposite directions, and are then viewed through a stereoscope, over some of the areas one set of lines will prevail, and over other areas the other set of lines; in still other areas either a confused blur or a network composed of both sets of lines will indicate the result of an attempt to blend the two images.

2. Other visual illusions arise from *misinterpreting the import of a felt intensity of muscular effort.* Under this law may probably be brought the fact that vertical distances are usually perceived as larger than equal horizontal distances; and an exact square appears higher than its breadth. By inverting an S or 8, the actual difference of the two parts appears greatly magnified. Many visual illusions of exaggeration are due to the muscles of the eye being tired or lamed. And, in general, an increased amount of sensation and of conative feeling in the perceptive process produces an illusory extension in the magnitude of the visual object.

Frequently combined with this effect is the working of an allied principle. In measuring any space with the eye, if the space is broken up with points or lines, or is filled in with a number of objects, there is a slight tendency to pause at each interruption of the process of measuring; and this tendency requires work in order to overcome it. Hence squares intersected with lines (see Fig. 19) appear enlarged in the direction in which they are repeatedly intersected; and the same thing is true of angles (as in Fig. 20).

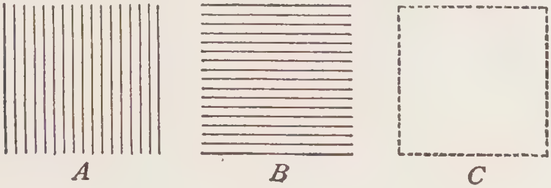

FIG. 19

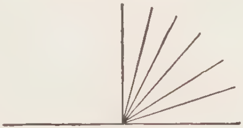

FIG. 20

3. The *tendency to prolong the motor activity* in the direction in which it has already been continuously exercised, in connection with the preceding principle, accounts for other visual illusions. In running the eye along a line or a surface, a sudden check to its movement, or an encitement to move in the reverse direction, tends to shorten the apparent magnitude; but an encitement to continue the movement in nearly the same direction increases the apparent magnitude. This is the principal reason why, in Fig. 21, of the equal lines *A*, *B*, *C*, and *D*, the line *B* appears longer than *A*; but *C* appears longer than *B*; while it is quite impossible to persuade ourselves that *D* is not much longer than *A*.

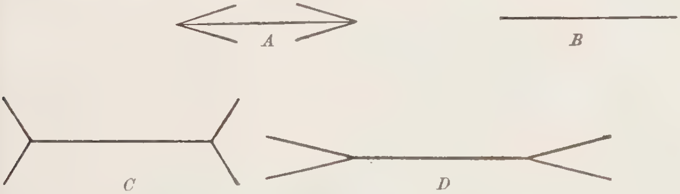

FIG. 21

[The foregoing principle can be illustrated experimentally by preparing an "illusion board" after the pattern of the following diagram (invented by Heymans; for a full description see Scripture, "The New Psychology," p. 400), in which, by shoving in and out one portion of the board, the accuracy of our measurement and the amount of illusion can be determined (see Fig. 22). Schoolboys unwittingly illustrate principles 2 and 3 when they try the trick of placing three cents along a line so that the distance between the outer rims of *A* and *B* shall equal the distance between the inner rims of *B* and *C*. In the figure on the next page (No. 23), the distances *are*, but by no means *seem to be*, exactly equal. Doubtless also, the tendency to locate any symmetrical small body about its centre, and thus to measure the distances between *A* and *B*, and between *B* and *C*, by their centres rather than by the rims, enhances this illusion.

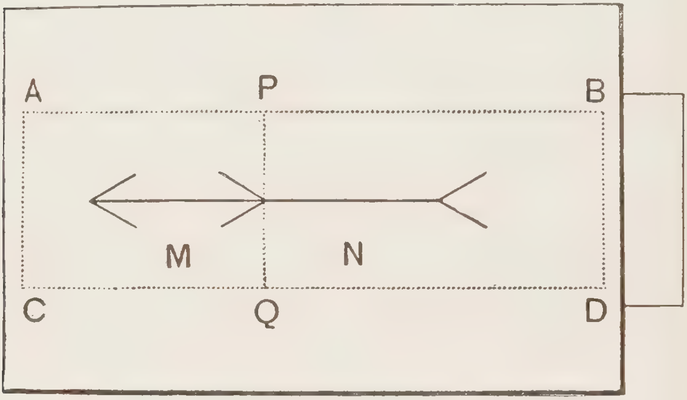

FIG. 22

4. Many visual illusions depend upon the principle of *suggested contrast with the environment.* The more contracted the suggested environment of the space-dimension in question, the smaller will the object appear; and *vice versa.* Here the illusion is brought about by mistaken application of a standard. Thus also the sides of a triangle seem smaller than the equal sides of a square; the sides of a square than the equal sides of a pentagon, etc. This principle is combined with the others in some of the instances already given.

5. Somewhat similar are the illusions which arise when we *set distant objects at a mistaken distance, and then give an illusory magnitude to them;* or when we give them a mistaken magnitude and, in consequence, perceive them at an illusory distance. Thus the perceived size of the full moon varies from that of an orange to a large cart wheel, and its distance from "away up" in the sky to "just behind"

the trees in the next field. Other more complicated ideas and doubtful but conscious estimates enter, however, into such illusions of sight.

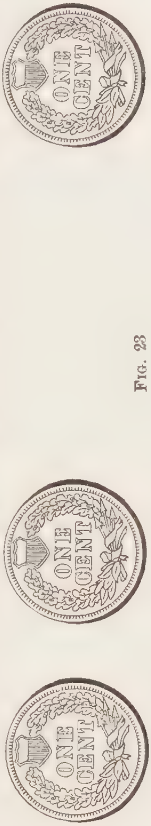

FIG. 23

6. Under certain circumstances *the more creative activity of the image-making faculty*, taking its start from meagre sensation-data and following the principle of suggestion, results in astonishing illusions and hallucinations. Thus Binet tells of a hypnotic patient who, having the suggested hallucination of a portrait on a sheet of paper on which a rude figure of a hat had been drawn, perceived the suggested portrait wearing the actual hat. The visual sensation-stuff which suggests our elaborate dreams of seeing things is customarily equally meagre. Similar illusions enter into all our normal perceptions. It has already been repeatedly shown how in all visual perception, unless it is deliberately minute and careful, the few sensory-motor data serve as suggestions which are filled in with a rich content of revived images. No wonder, then, that the result is so often illusory.

Education of the Senses in Perception. — Our rather long study of the development of sense-perception may well end by stating two principles which concern the educative value of the senses: (1) The development of perception by the senses is *mental* development; and the education of the senses in perception is, therefore, education of the entire *mind*. (2) We have no other way of arriving at an assumed knowledge of things than to take our start with the careful training of the senses in perception. This is the way to separate between truths of fact and the manifold illusions and hallucinations that mix with all our sense-perceptions. A guilty conscience and a disordered function of the organism explain Macbeth's vision, which is but

> "A dagger of the mind, a false creation,
> Proceeding from the heat-oppressed brain."

Still, "knowledge of things" is, as we shall see later on, by no means wholly a matter of sense-perception.

[The pupil should study some book giving the "physiology of the senses," such as that by M'Kendrick and Snodgrass, or the author's Outlines of Physiological Psychology. Of the larger psychologies the treatment of the subject by James: Principles, II, pp. 76–324, is far the best. This may be supplemented by Bain: The Senses and the Intellect, pp. 59–100, 159–190, 360–448; Scripture: The New Psychology, Part IV, "Space"; and Sully: The Human Mind, I, pp. 204–235. The monographs on the subject are almost innumerable; among them may be noticed, Max Dessoir: Ueber d. Hautsinn; Féré: Sensation et Mouvement; Stumpf: Raumvorstellung; T. K. Abbott: Sight and Touch; Le Conte: Sight. Edmund Parish's book on Illusions and Hallucinations may be consulted with profit. This subject may be experimentally studied by "Bradley's Pseudoptics"—the apparatus prepared under the direction of Professor Münsterberg. The advanced student will, of course, resort to the more elaborate treatises of Wundt, Helmholtz, Hering, and others.]

CHAPTER X

MEMORY

The processes of ideation, by fusion and association under the principle of contiguity (see chapter VII), lay the basis for the development of the three so-called "faculties" of Memory, Imagination, and Reasoning. These faculties do not, like perception, seem to make us "immediately aware" of things, of their qualities and their relations. In memory we have *ideas* of things once perceived; in imagination we make useful or fanciful combinations of these *ideas;* and in reasoning we rearrange these *ideas* so as to increase our knowledge about things. *Re*-presentation is, then, dominant in all such complex mental processes. In all three forms of representative faculty objects, once immediately known, are *presented* to consciousness *again, in the form of ideas.*

On the other hand, attentive and discriminating consciousness, self-selecting and self-directed, in the pursuit of practical ends, is implied in all memory, imagination, and reasoning. For these faculties are not mere resultants of increased complexity in the processes of ideation. And the development of mental life along these cognate lines of activity depends upon something more than upon a bare increase of complexity in such processes. This is especially true of imagination and of reasoning, whose essential character seems to consist in giving us something new, something beyond that of which we can become "immediately aware" by sense-perception.

Of these three forms of the development of mental life, we consider first —

The Nature of Memory. — When we remember, some past experience of our own reappears in consciousness in the form of ideas. But the following particulars are illustrated by every complete act of memory: (1) It is itself an event in the stream of consciousness. It is my activity, or state, of remembering; and, therefore, I immediately know, "am aware" of, "feel sure" of, — with more or less clear and strong conviction — the truth of what I thus mentally represent. Memory is thus a species of knowledge. (2) The actual event, which I represent in consciousness, is known as belonging to time now past. The event actually *was* — a year, an hour, a moment, ago. Memory implies, then, some development of "time-consciousness." (3) The actual event, like my present remembrance of it, was an experience of mine. I cannot remember another's experiences, unless I have already known what those experiences were, and have made them my own. Memory implies, then, some development of self-consciousness. (4) The memory of the event, however, must distinguish itself from the actual event remembered. It is this peculiarity of the memory-act or process of consciousness, which makes it to be called *re*presentative; and which compels us to speak of its introduction into the stream of consciousness as a *re*call, *re*collection, *re*miniscence, etc. Memories are ideas, not perceptions of, or thoughts about, things. (5) Inasmuch, finally, as we habitually remember some one event rather than some other, and remember this event in connection with a consciously allied perception, or as a member of a recognizably appropriate train of ideas and thoughts, we are led to investigate the "laws of memory."

Stages of Memory. — It has been customary to speak of three stages of memory, — retention, reproduction, recognition. Properly speaking, these so-called stages do not all admit of a truly psychological treatment. For retention and reproduction, since the former takes place entirely, and the latter partially, outside the stream of consciousness, belong to the *conditions* of memory, rather than to the psychosis itself. They are not, then, properly speaking, "stages" of psychical memory. So far as reproduction takes place in consciousness, it is itself nothing but the actual process of remembering, whether conducted in an automatic or in a more or less consciously purposeful way. The simple and fundamental fact is: *I remember;* — that is, *a modification of my present conscious mental life appears, which includes the conviction that it represents some past event in the same mental life.* But in order to understand this fact, we may consider it from three points of view: it implies retention; it implies reproduction; and it is a true recognition, or "knowing over again."

Memory as Retention. — The word *retention* cannot be applied to any genuine psychical act or process whatever. The mind may not be conceived of as a thing which can retain, or hold, as under lock and key, its store of acquisitions. Neither is it like a lump of wax, or of putty, which keeps the impressions made upon it by contact with various things. And, indeed, essentially the same thing is true of the brain. The physiological principle of "dynamical associations" among the elements of the nervous system, and the cognate psychical principles of habit, and of the renewal of the ideation-processes under the laws of fusion and association, are the preconditions explanatory of the phenomena of memory, regarded as retention. *As distinguished from these laws of reproduction, which are themselves to be regarded as necessary conditions of recognitive memory, there is no such thing known to scientific psychology as "retention in memory."*

What is popularly called the "retentive power" of memory — the figure of speech which seems to teach that memory-images are "stored" away — has been conceived of in two ways, physiological and psychological. Thus Plato and St. Augustine regarded the ideas as continuing to exist somehow in the mind. And even Bouillier declares: "No idea, at least of those which memory may recall, ever leaves the mind entirely." Truer to science is the poet Longfellow:

> "Themselves will fade,
> But not their memory,
> And memory has the power
> To recreate them from the dust."

Equally unsatisfactory with Plato is the modern physiological theory which thinks to explain recognitive memory by referring to "scars," as it were, or "polarized nerve-cells," or "association-tracts" in the brain, with the added phenomenon of consciousness.

Physiological Conditions of Retentive Memory. — Little need be added on this subject to what has already been said (p. 128 f.). The special conditions of an act of memory, regarded as implying retention, are to be found (1) in the condition of the centres and association-tracts of the brain where the original presentation occurs, and also (2) in the state of the same centres and tracts when reproduction takes place. Soundness of brain-tissue and a proper supply of well-oxygenated blood are most important in fulfilling these conditions. No other so-called faculty suffers more from organic or functional disturbances of the brain than does memory.

This general dependence of retentive memory upon the soundness and the healthy functioning of those centres and association-tracts of the brain which were concerned in the remembered original, is illustrated in many ways. It is found that persons who become blind before the age of from five to seven years, do not ordinarily retain visual images so as to dream or to think in terms of them, in after life. This is because the "dynamical associations" are not firmly established earlier than this age. Those who are "growing old" mentally, often begin first to complain of loss of memory. Any impairment of tissue or weakness of function, in any of the brain-centres, is followed most promptly by disturbance of this form of mental life. Astonishing differentiations of the loss of memory are dependent, although in ways whose details cannot be traced, upon the same physiological conditions. Thus after fevers, much of one kind of knowledge may be lost, while another kind is retained. Forbes Winslow even tells of a man who, on recovery from an illness, had forgotten the letter F. In general, as says Kussmaul, "the more concrete the idea, the more readily the word to designate it is forgotten when memory fails."

Psychical Conditions of Retentive Memory. — What we remember at all, and what we remember best, depends chiefly upon the relations which attentive and discriminating consciousness sustains to the processes involved both in the original perception and in the reproduction. Among such relations the following are important: (1) The vividness of the impression, and its attraction to itself of "interest," in the first instance; (2) the sympathy with our permanent disposition or temporary mood at the time of acquisition; (3) the thoroughness with which the memory is wrought, by repetition, into the texture of our mental life; (4) the favoring or unfavorable direction of our practical ends; (5) the amount of voluntary effort given to "fixing the thing in mind" or "committing it to memory"; (6) the firmness of the logical connections between the particular event and our established principles of judgment or habits of conduct. Events that stand well in these and similar ways as related to our entire mental life are likeliest to survive the obliterative influence of time. They constitute the permanent retentions of memory.

In spite, however, of these undoubted psychical laws which control memory considered as retention, there are not a few phenomena which appear not to conform to them. On the one hand, some things which we have taken most pains to commit to memory, have been most interested in, most sympathetic with, and which our pursuit of practical ends most binds us to remember, slip provokingly, beyond all recall, from our mental grasp. On the other hand, the train of consciousness is not infrequently seen to be loaded with worthless, grotesque, and offensive rubbish, whose existence and recurrence in the stream of consciousness seems to defy all laws. Clinging "parasites" of memory, they seem to be; and how frequently do they possess the vitality to choke the trees which we most wish to cultivate! Again some trifling fact springs, unbidden, into full consciousness out of the concealed depths of a forgotten past. Thus Delbœuf tells how he dreamed of *asplenium ruta muralis*, although he was no botanist and did not know that such a plant existed; only subsequently he discovered that two years previous to the dream his eye had rested thoughtlessly, for an instant, on this collection of, to him, meaningless words.

There is a kind of retention in memory which psychologists have neglected, but to which we shall give the title "metamorphosed," — a sort of memory-image kept in mind in a form of substitution. Thus when one has failed to execute a commission, or to do an errand, or when one has left behind one's book or one's umbrella, a sort of vague and guilty uneasiness gives a peculiar shading to the stream of consciousness. This is chiefly due to the fact that this stream of consciousness does not correspond to the idea previously formed of what it would be. Such an idea lingers in the "fringes" of consciousness as an obscure memory-image of a certain place to be visited, or thing to be done, or as a vaguely felt system of pressure and other sensations due to the weight we were carrying, etc. Apparently such "metamorphosed" memory, or substitution of obscure allied feelings and images for clearly recognized and definite images of another kind, explains many of the phenomena of hypnotic memory; and perhaps also certain "revelations" of clairvoyants, "trance-mediums," and the like. These often show their kinship to animal "tact."

It is perhaps possible to explain also in this way those alleged completely unconscious associations which some experimental observers (Scripture and Aschaffenburg) claim to have found. Probably no so slight or temporary modification of sense-consciousness takes place that it does not enter into some connection with exceedingly obscure and unsuspected forms of our total experience. It is difficult, for example, to see a picture or a word without fusion of the visual image with inchoate muscular, auditory, and perhaps olfactory and gustatory impressions. Thus the principle of contiguity in consciousness, once established, may be expanded so as, conjecturally at least, to cover all these cases. So-called "unconscious thinking" is "feeling"-association.

Memory as Reproduction. — The principles which control the recurrence of the ideation-processes in consciousness have already been discussed (p. 148 f.). The more elaborate processes of representation which are called memories are under control from essentially the same principles.

Yet the application of these principles is modified in the development of memory, when ideation becomes *a reknowing of past experiences*, by the following considerations: (1) The reproductive processes are brought under the control of the mind in the pursuit of its practical ends. *We recall* one event, rather than some other, in order to make use of the memory for carrying out some purpose of ours. "Recollection"—or the gathering together again of the factors which have previously been together in the psychosis—may be a voluntary and purposeful reproduction. (2) The development of imagination and of intellect profoundly modifies the reproductive aspect of memory. Imagining "how it was" influences the processes which restore, or reproduce, the event in memory. Thinking "about it," or thinking "how it must have been," both guides and checks the same processes. (3) The acquisition and use of language also modifies profoundly the character of the reproductive processes. A high degree of speed and of accuracy in the recall of past events could not be attained without language. Words are compacted memories. Every word is fraught with a score, a thousand reminiscences. By remembering words we are able to remember things and to *re*-cognize them. By the use of words as a support for the reproductive processes we attain (*a*) the better recall of our past experiences in their connections, and (*b*) the possibility of that varied and expansive kind of memorizing which belongs to conceptual knowledge.

The development of memory as reproductive depends upon the three foregoing considerations in so important a way that each of them demands a brief separate mention.

Memory as Voluntary and Practical. — Life consists largely in the pursuit of practical ends under the control of will. But the pursuit of ends requires us to learn how to use the means which alone can make the pursuit successful.

And this implies the gaining control of the reproductive processes. In connection, then, with the gradual development of memory all the characteristics of the elementary ideation-processes, as they become fused and associated, are brought into play. But *the processes of ideation are all, more and more as memory becomes a developed faculty, subordinated to control in the pursuit of chosen ends.*

In learning to walk, to talk, to measure distances and perceive forms with eye or hand, the intellectual activity of the child is employed upon a basis of reproduced sensation-complexes. These sensation-complexes must be recalled in idea and used to guide the volitions of the child in the attainment of the practical ends — of walking, talking, and of knowing and using things. But the series of his reproduced sensations becomes constantly more condensed, and the individual sensations more schematized, as it were (compare pp. 142 f. and 150 f.). By and by it is, as in the case of the trained musician, but a "leap" from certain black lines and dots to the complex motor activities which the vocal organs, or the hand and arms, must execute in order to produce the correct tones. Yet a close watching of the 'cellist, for example, will detect him reproducing by slight movements of fingers and arms the required mental images which are guides to the completed movements of the same limbs.

Imagination and Thought in Memory. — That memory involves image-making faculty we acknowledge by speaking of it as giving "pictures" of past events. That it involves reasoning and judgment is implied by such phrases as, "I am trying to think," or "I cannot think," precisely what happened at that particular time. Few facts are more impressive than the constant confusion which takes place in most minds between faint memories and vivid imaginations or thoughts. It often occurs that one is unable to say definitely whether one is remembering an actual experience or is creating its like in imagination; and perhaps no amount of thinking the matter over can quite clear up the confusion. But of this more later on.

Influence of Language on Memory as Reproductive. — Especially strong and pervasive is the influence of language upon the reproductive function of developed memory. In fact, a very large part of adult memory is "word-memory"; and the development of memory is in large measure the development of "language-memory." We carry about with us, so to speak, all our very prolonged and complex experiences done up in verbal packages. We only reproduce the *story* of them which we long ago committed to memory; we do not reproduce *themselves.* Sometimes, when we have time, we sit down with ourselves and "live them over again" in memory. But ordinarily all our past experiences, when revived, only bear the scanty conceptual form to which they have been reduced when consigned to word-memory.

Certain phenomena in reaction-time confirm the advantages of word-association and word-production. Thus Münsterberg found that the answer to such a question as, "On what river is Cologne?" occupied 808 σ to 889 σ; but the proposal of a question in the form, "Apples, pears, cherries, etc., which do you like best?" shortened the time to only 694–659 σ. In all cases certain words in our questions are *full of memories;* but if these "memorable words are got before the mind" early in the question-sentence the act of reproduction and the following choice is completed more quickly.

Moreover, words are remembered as connected into sentences, propositions, trains of argument, tales descriptive of past experiences. Thus the memory of one part of our experience tends powerfully to reproduce the connected whole. The memory of the number of a certain proposition in geometry, or of the words "*pons asinorum*" or "binomial theorem," may *store* for ready reproduction a whole train of associated ideas. Indeed, language-memory constitutes the principal portion of our stock ideas bound together and made ready for rapid and firmly connected reproduction.

Nature of Recollection. — Highly psychological languages distinguish between active and merely passive reproduction. (For example, in Latin we have *reminiscor* and *memini;* in German, *Erinnerung* and *Gedächtniss;* in French, *souvenir* and *mémoire.*) The distinction is not absolute; and we have seen that intelligent control of the reproductive processes enters into the development of the entire faculty of memory. But we are sometimes well aware of intelligently and deliberately trying to reproduce the past, and of succeeding more or less perfectly in our effort.

The peculiar feature of this kind of memory is, that *voluntary attention considered as a selective and distributive energy, working toward an end consciously conceived, controls the time-rate, order, and completeness of the reproductive processes in the interests of that end.*

The following considerations serve to distinguish the nature of those modifications of consciousness which are characterized as "trying to recollect": (1) In recollection some end is conceived of as being served by the reproductive process. But this setting of the end of recollection before the mind is itself an act of memory. We cannot try to remember, unless we already to some extent remember — enough, at least, to know what it is we wish to reproduce more clearly. (2) The essential thing about recollection then is the rendering of what Sully has called a "vague subconscious mode of representation" into a complete memory. We are getting hold of a "clew" and following it into the light. (3) In selecting, laying hold on, and following the clew, we are choosing, — are active as will. But (4) we find our clew, and complete the desired process, in dependence upon multiform processes of reproduction that seem almost completely passive. The ideas are thus thrown up in consciousness *for us*, and *before us*, while *we watch* to see which ones will serve our purpose best. (5) In recollection an increased amount of psycho-physical expenditure is shown by feelings of strain and effort, while the process is going on, and of relief and fatigue, when the process is completed.

A similar control over the process of reproduction may be shown in the inhibition of recollection, that deliberate refusal to entertain or suffer the reproductive process, which is sometimes called "putting the thing out of one's mind." Men of strong character acquire unusual facility in refusing attention to things they desire to forget, — the same effect, though gained in opposite way, which comes to the weak mind from lack of concentrated attention. Kant is said to have written in his journal: "Remember to forget Lampe" (his faithless and discharged servant).

Influence of "Atmosphere" and of Feeling. — More powerful than our own wills to control the reproductive processes are, oftentimes, our physical or social environment, and our condition as respects quickened or deadened feeling. The "systematic association," to which some writers would reduce the laws of the reproductive activity of the mind, is not governed by practical ends alone. We must recognize a sort of artistic inclination to make our memories fit the present surroundings. To this artistic harmony between memory and the "atmosphere" with which perceptive consciousness surrounds us, we owe in part the fact that —

> "Each substance of a grief hath twenty shadows,
> Which show like grief itself, but are not so."

The adult man, on returning after long absence to his boyhood's home, finds the environment recalling a hundred forgotten incidents of his early life. Whereas the traveller in wholly foreign scenes — for example, on a first visit to Japan — is scarcely able to suit his memories enough to his own past to seem "like himself."

In the "hunt" for particulars stored away in memory, the effect of the present arousement of feeling is often especially marked. From the physiological point of view we are then made to witness the effect upon the reproductive processes which comes from having the entire brain-mass excited to unwonted activities. In certain great historical speeches — as, for instance, that of Huss before the Council of Constance — the whole of the speaker's past experience seems to be placed, under the impulse of emotional excitement, fully at his command. Philo Judæus tells us how his "inspirations" made memories and thoughts fall like an overwhelming shower upon him.

But the mysterious and peculiar *mental* activity involved in the development of this faculty becomes apparent only when we consider —

Memory as Recognition. — *In a complete act of developed recollection the present psychosis is consciously related to the past experience of the subject as representative of that past.* Unconscious retention — whether conceived of as a "holding in store" of certain cerebral habits and dynamical associations, or as a "keeping" of ideas within a metaphysical entity called the mind — might be absolutely perfect, and yet no actual memory-consciousness develop. Reproduction might be secured in perfection, and might go on forever, and yet no faintest shadow of a true remembrance pass within the soul. Memory, in the full meaning of the word, is a *knowing* of the *past*, and of *my* past. It is *re-cognition.*

Each one of the foregoing three essential "momenta" must be borne in mind if we are to understand the distinctive character of developed recognitive memory: (1) It is a form of cognition. In every such clear act of recollection I arrive at a knowledge of some event, some quality of a thing once perceived, some experience of my own, etc. This knowledge has all the intellectual qualifications of a genuine act of cognition. In it I am a knower; and without such memory growth of knowledge is impossible. But (2) what is now known is *re*-known. *It* was a past thing; and in remembering it I must — at least with some degree of definiteness — set it in its position in past time as having occurred *then* and not otherwheres. This act of setting implies some developed consciousness of time. Especially (3) is what I remember known as belonging to *my* experience. It is something formerly known to, or having happened to, my *Self*. A continuity of experience, a stream of consciousness, of all of which I am the one subject, is, therefore, implied in recognitive memory.

Recognitive memory, indeed, involves the consciousness of time, the consciousness of Self, — both developed to a certain extent, — and growth in the activity of discriminating consciousness as the faculty of comparison and judgment; but recognitive memory is no mere compound of all these. In the full development of this faculty we distinguish a form of cognitive activity which is more than mere reproduction without recognition, or mere assimilation without the consciousness of time and of Self. Mysterious as it may seem, the admission must be made: *I transcend the present and, by a truly spiritual synthesis, connect it with the past into a unity, in every act of developed recognitive memory.*

It is obvious that memory cannot be explained as though it were a *mere* succession of images, or a *mere* succession of consciousness of any kind. But, just as obviously, the degree of recognition — the amount of clearly conscious representative cognition — which belongs to different acts of memory, varies greatly. This is because the faculty of memory, like every other form of mental life, is itself subject to the laws of development. The memory of childhood is relatively lacking in recognition. It is more mechanical, more deficient in those qualities which depend on time-consciousness, self-consciousness, and maturity of judgment. Many adult reminiscences are only faintly recognitive. Very often memories and imaginations, so intermingled that we can scarcely distinguish them, troop arm in arm across the field of consciousness. Nevertheless, we know what it is to challenge the authority of our own mental images; and to come to the clearest consciousness that *this particular event did actually occur in our own past experience.*

Acts of conscious reproduction which terminate in some form of recognitive memory must, therefore, be distinguished from those which do not thus terminate. Thus, for example, the meaning of many words in a foreign language with which one is familiar might be said to be perceived, or immediately cognized, rather than remembered or recognized. But for any particular word one may be obliged to pause and recall what its meaning has been learned to be. In such a case the process of recollection, terminating in a true recognitive memory, gives the truer description of the character in its flow of the stream of consciousness.

In order further to illustrate principles already established we consider briefly —

The Kinds of Memory. — As to the relative characteristics of this faculty which different individuals possess, or which enter into its different performances, psychologists have distinguished "tenacious" and "spontaneous" memory; "poor" and "prodigious" memory; "perfect" and "imperfect" memory; "logical" and "artificial" memory; "voluntary" and "involuntary" memory. Fixing attention on the kind of objects remembered, one may speak of "visual" memory, or the "memory of names," of a good or poor "memory for principles," etc. The meaning of the adjectives used in such classifications scarcely needs explanation. What needs emphasis is this: all the terms are relative, and do not in the least weaken our estimate of the absolute value, as applicable to all memories, of the laws already announced. In the language of Volkmann: "*A* memory is everywhere; *the* memory is nowhere." Or, to use the head-line of Sully: "*Memory, a Cluster of Memories.*"

Remarkable instances of spontaneous memory are not infrequent; they are instructive as showing the possibilities of our future experience rather than as informing us how to attain similar experiences. Among them is the butcher of the *Bicêtre* who in his paroxysms of madness recited long passages from the tragedy of Phédre; or the painter who reproduced from memory the altar-piece of Rubens, at Cologne. Prodigies of memory are also not very infrequent; as, for example, Cyrus, who is reported to have known by name every soldier in his armies; or Themistocles, who knew all the 20,000 citizens of Athens; or, on the higher plane of science, Scaliger, Niebuhr, and Pascal.

Astonishing feats of memory in special subjects — like those of Zacharias Dase, who could glance at a row of 188 figures and then repeat them backward and forward — excite more interest perhaps than they really merit. They emphasize the marvellous functioning of the brain instead of assisting in the explanation of the mental processes involved in recognitive memory. And, as will appear later, they do not afford examples for the attempt at imitation by the average man.

Verification of Memory. — Experience in our most ordinary life, as well as in courts of justice, throws grave doubts over the trustworthiness of memory, even of the developed recognitive sort. It is not that so many men are tempted to lie — at least, a little — of which we are now speaking. It is rather that, even with the best intentions and with no little painstaking, memory is so often self-deceived; and this takes place not infrequently when its own belief is strongest and most undoubting. Careful research, especially into the witnesses of so-called telepathy, spiritualism, and all manner of "abnormal" phenomena, confirms the testimony of ordinary experience and of experiment: not only do illusions and hallucinations enter into perceptions, but also all manner of delusive imaginings and misleading thoughts are involved in our ordinary memories.

The problem of verifying or correcting memory becomes, then, an exceedingly important problem. Its theoretical solution takes us into the field of philosophy, in the department called "Theory of Knowledge." Its practical solution requires that intellectual and moral discipline which comes only with the development of the whole mind. But psychology recognizes three general considerations which have to do with the verification of memory: (1) The clearing up and completion of the memory-picture, with its accompaniment of intelligent belief, is, within certain limits, its own verification. Where the memory-picture is obscure and lacking in details, or vacillating, it doubts itself, so to speak. The "clarifying" of this picture becomes then a problem, whose emotional accompaniments offer a strong *motif* to attempt its solution. The process of recollection, as already described, affords then the legitimate solution of this problem. If the process terminates favorably, then the recall into consciousness of the clear and detailed memory-picture, recognized in and believed in, becomes an established and verified memory. Thus *we confirm memory by other memory, with an indestructible confidence in good memory as the very basis of the correctness of all our developed discriminating consciousness.*

(2) Social influences are, however, exceedingly important in the verification or correction of the individual's memory. If nineteen of twenty men who have witnessed the same event remember it one way, and the twentieth in a quite different way, the bare fact of being in such a dreadful minority will influence the twentieth man's trust in his own memory. Yet the one man may well enough remember correctly, and the nineteen be quite wrong in their memory. This has happened over and over again. The confidence of society will always, however, tend toward the majority; nor can the one man easily escape the effect upon his own confidence from this environment of social distrust.

(3) In all cases of doubt, *thought* comes in to verify or to correct memory. That possibility of connecting the alleged event with known causes, operating under recognized laws, which is sometimes spoken of as the "probability" of the event, will inevitably perform this function for memory. If the one man's memory were of the highly probable thing, and the memory of the nineteen dissenters were of the highly improbable thing, then all who have confidence in the so-called "reign of law" would believe the one man to the prejudice of the memories of

the majority. Yet the one man might be alone in remembering the most highly improbable thing, and also be alone in remembering aright.

The summing-up of the matter for the psychologist is this: while recognitive memory is knowledge, and without trust in it, no knowledge at all is possible; still knowledge itself is so complex and subtly variable an experience that it cannot escape the principle of development. To this thought we shall return later on.

Loss of Memory. — Reference has already been made, in a general way, to the physiological explanation of the loss of memory. The detailed explanation of the astonishing peculiarities which some cases exhibit, seems thus far to be beyond the power of both physiology and psychology. The psychological theory can only resort to conjectural combinations of those principles which have to do with so-called "committing to memory," "retaining in memory," and with either involuntary recall by association of ideas or voluntary recollection. By such combinations we are able to conjecture why one thing is lost, either temporarily or apparently permanently, while others are retained, etc.

The physiology of the representative processes is made more obvious by the modern discoveries in "the localization of cerebral function." These discoveries will be briefly given in a later chapter. It is enough at present to say that they show how an almost indefinite variety of forms is possible in the impairment of that soundness in the cerebral centres, and in the normal functioning of the association-tracts, which is necessary to memory. On the psychological side, the general truth should be borne in mind that loss of the memory of many things is necessary to the retention and reproduction of other things. Memory, as recognition, is always of *some particular experience;* but imagination and thought are rather forms of the representation of "the universal." Good memory consists not in the possibility of reproducing all our experiences, but in the ability to recall those that are adapted to the ends of mental life.

Education of Memory. — All sound and safe training of memory must, of course, proceed according to established physiological and psychological principles. Of these, the following are among the most important: (1) The acquirement of a phenomenally retentive and spontaneous memory is impossible for the average man. The very character of our brain-structure and of its functioning prevents most of us from becoming prodigies of memory. Overstrain, loss of valuable energy needed in other directions, and general mental decline, surely result from the attempt thus to cultivate this faculty. On the contrary, (2) to secure the general conditions of a sound brain and a sound mind is to prepare the way for the best training of memory. (3) The control of attention, as quickened by the feeling of interest and directed toward intelligently conceived ends, is the gymnastics especially needed for securing a masterful memory. (4) To secure such connections between our memories as will bind them into a well-organized totality, and enable the weaker to lend support to, and derive help from, the more firmly established, is the effort of the intelligent trainer of the so-called faculty of memory. This is made the more feasible, because it is such firmly connected memories as are latest and least easily lost beyond recall, in the general fading of memory. (5) Remote as the truth may seem at first sight, the education of memory is largely dependent upon the cultivation of character. We are reminded forcibly of this when the relaxation or loss of voluntary control over the mental train results in the throwing up into consciousness of those irrational, absurd, and even detestable relicts of our past experiences, to which reference has already been made (p. 231 f.). We are reminded of the same thing when the "stores" of the memory of some person who is temporarily "off-guard" are unloaded before our eyes; or when the shallow and faithless character of past acquirements is revealed by the failing and false action of voluntary recollection.

Systems of mnemonics are safe and valuable only as they follow the foregoing laws. The best of them are most available in giving one the ability more easily to keep in mind, for a temporary purpose, a multitude of disconnected facts which it is desired to handle in the interests of some particular occasion or cause. In so far as they interrupt or divert the "natural life of the mind" and load it with petty and grotesque details, they are harmful.

Important maxims to be observed in the training of young children may be based upon the experimental results of Ebbinghaus and others. Such are, (1) Do not undertake too long tasks of memorizing, in one effort, as it were; (2) Find some meaning in what is memorized, so that it may be connected with the rest of experience in an intelligible way; (3) Repeat, with fixed attention, until the thing is "fastened in memory"; (4) Bear in mind that a really good memory cannot be secured without cultivation of the powers of perception and reasoning. Nor can a *good conscience* be left out of the account.

[In addition to works cited at the end of Chapter VII, the pupil may consult; Articles in the Am. Journal of Psychology, II, i–iii, by W. H. Burnham; Sully: The Human Mind, II, Appendix D; Taine: De l'intelligence, II, i–ii. On the training of memory, see Edridge-Green: Memory and its Cultivation; Holbrook: How to Strengthen the Memory; and Kay: Memory, What it is and How to Improve it.]

CHAPTER XI

IMAGINATION

As compared with memory, that development of the life of representation which is called "Imagination" stands partly on a higher, and partly on a lower, intellectual level. Imagination is not a re-knowing of what was actual, as recognitive memory professedly is; it, therefore, stands in no such immediate relation to the acquisition of knowledge. And yet the extension of knowledge into its higher ranges, the passage from the seen to the unseen, from the present in time and space to the distant and the future, makes strenuous demands upon the image-making faculty. It is not inventors, artists, and poets alone, but also men of "pure" science and of philosophy, who require a high development of imagination. For as Schopenhauer has said: The man without imagination stands to him of the gifted and cultivated mind, "as the mussel fastened to the rock, that must wait for what chance may bring it, is related to the animal that moves freely or even has wings."

Nature of Imagination. — What it is to imagine may be best understood by considering the difference between this activity, when it is most voluntary and purposeful, and the activity called "recollecting." Both agree in being (*a*) processes of ideation, or image-making in the most general meaning of the term; (*b*) reproductive processes and thus dependent for their data on experience, either as perceptive of things or as consciousness of Self; and (*c*) both involve a certain amount of discriminating consciousness voluntarily applied in the interests of certain ends. All this belongs to the stream of consciousness whether one is trying to recall the castle of Kronberg or to build one's self a "castle in the air"; whether one is remembering how one felt when made the subject of detraction, or is trying to imagine how Beethoven must have felt to find his work treated in similar way. On the other hand, the most sober acts of imagination differ from the most uncertain and flighty attempts at recollection, in that (*a*) the former are not accompanied by that added consciousness of a reference of the mental picture to past experience, which the latter have; and (*b*) the former are not accompanied by belief in the known reality of their objects, as the latter are.

Imagination is, then, a development of ideation or image-making considered as, to some extent, set free from recognized dependence upon previous experience with the actual behavior of Self or of things.

Physiological Conditions of Imagination. — All our imaginings are doubtless connected (as the very word "reproductive" suggests) with the recurrence of physiological processes, both of the brain and of the external organs, that are similar to those involved in the "immediate awareness" of the same objects. Pathology and experiment indicate that the brain-centres involved in perceiving and in imagining visual objects are the same. They also indicate that other centres may be regarded as chiefly concerned in audition — whether this be a perceiving of the meaning of sounds heard or an imagining of sounds. Both experience of the ordinary type and carefully guarded experiment prove that the motor activities of the external organs — eye, hand, tongue, etc. — which are needed for a complex process of imagination are similar to those employed in the perception of the same class of objects.

When Kant urged that, in order to *imagine* a straight line one must *draw* it, he appealed to this fact of experience. Indeed, to know what a straight line really is, one must conceive of a passage from A directly (that is, without turning aside) to B; and slight inchoate movements and strains of the eye, or of the arm, are originally involved in this act of "conceiving." Stricker has proposed to test the dependence of imagination on motor consciousness by defying us to image a word in which labials or dentals are prominent (like "bubble" or "toddle"), with a perfectly motionless, wide-open mouth. An admirer of the actor Garrick once praised his wonderful gift of imagination by saying that he "appeared to be present in all the muscles of his body." The excitement and suppression of secretions, the production of burn-marks and stigmata, in the case of hypnotic subjects, by the influence of suggested image-making, is in evidence here.

The complete physiological conditions of a complex act of imagination seem to involve both centrally initiated ideation-factors and also motor-factors — the latter both centrally and peripherally reproduced.

Imagination as Reproductive. — The distinction often made between reproductive and genuinely productive, or creative, imagination is only relative. It is like the distinction made between the "original" and the unoriginal thinker. Certainly, all acts of imagination, however much of new creation may enter into them, are largely of the reproductive order. That is, they produce again the mental images derived from previous perceptive experience; although they may change their quantity and their space- and time-relations, and may throw them into various new forms of succession or of combination. Such development of reproductive imagination depends chiefly upon two sets of considerations: (1) The mental images become more and more "freed" from all definite connection with the places and times of past experience (see p. 149 f.); and (2) as the intellect develops, and there is a corresponding increase in the complexity of our practical ends, there is also growing complexity and richness to the objects of reproductive imagination.

In dependence (1) upon the amount of "freedom" which the mental pictures have gained, and (2) upon the control of intelligence with its sanity of practical considerations in view, the different imaginations of men vary widely in their more reproductive function. Dreamers, children, the insane, the most reasonable adults when indulging the play of fancy, "let go" the mental images. Now the soul is a great artist, a most astonishing inventor of stories. And, when freed from the restraints of perceived environment or of remembered fact, it "runs riot" in fancy and enjoys the "rout" of its own image-making.

But, on the other hand, most adult and waking imaginations bow in some form to the laws of association as dependent upon perception, memory, and thought. Hence arise both the common sense and the bigotry which characterize the imaginative products of the ordinary man. Not only is this faculty unable to "play" freely, but it cannot even "work" freely enough to enable its owner to form the picture of how men of quite different past experiences have thought and felt and acted. The views and feelings of **B**. who belongs to the political or religious party **X**, are "beyond the imagination" of **A**, who belongs to the political or religious party **Y**.

In many dreams a very meagre amount of sensation-"stuff" excites the imagination to weave about it a most wonderful story. A straw between the dreamer's toes was imagined as the assault of robbers who impaled their victim through the foot; the asthmatic sleeper's distress for breath was imagined as the horse of the *diligence* in which he had been riding, that had fallen and lay panting and dying. Often chaos reigns, rather than the lowest order of dramatic unity, among the dreamer's imaginings. Thus Grüithuisen tells how he once imagined himself to be riding a horse which immediately became a buck, the buck became a calf, the calf a cat, the cat a beautiful maiden, and she, an old woman. The pictures drawn and the speeches or poems composed by certain insane, whose disease resembles a perpetual dream, illustrate the same unrestrained riot of image-making faculty. We are told of a Russian nihilist, long imprisoned, the creaking of whose slippers, as he paced his cell, was imagined to be "the haunting voices of damned fiends." *In such cases reproductive imagination is more like illusory perception than like recognitive memory.*

We do not need to resort to the experiences of sleep or of the madhouse to show the disadvantages, as well as the advantages, of a "hide-bound" imagination. Unrestrained image-making faculty runs riot indeed; but a bigotry, which is quite as far from the actual richness of human life and of the world of things, results from excessive restraint of imagination. The "Bourbon" and the "Philistine" may miss of knowledge through defective imagination, as truly as the insane person through his riotous fancy. Thus the man of common-sense cannot imagine that water can burn; very much as the king of Siam is said to have been unable to conceive of water as becoming solid enough for elephants to walk upon. It can scarcely be denied that the difficulty which men, in general, experience, because they persist in trying to imagine in sensuous terms the atoms or the waves of luminiferous ether, affects their belief in these alleged entities. Mr. Spencer's impossibility of "conceiving" the Absolute seems to us of a quite similar origin.

Imagination as Creative. — In all imagination something *new* is created or made. But this new creation employs as its material the mental images which have their origin in actual experience. *In all so-called "new" creations of imagination the mind takes its point of starting from memory-images; then, by processes of combination and differentiation, under the essential laws of intellect, it constructs the ideal object.* In this creative activity there is much we can understand; it belongs to the activity of mind, as conforming to laws, to the common-places of experience. But there is always something, and there is sometimes a great deal, which is mysterious and difficult or impossible to understand. Just as in memory we found "recognition" to furnish an element which the science of perception and of ideation could not wholly fathom, so in imagination the creative function of mind defies the same science to give for it a complete explanation.

Creative imagination involves (1) remembered experiences in the forms of perception and self-consciousness, (2) analysis by the intellect of these experiences, (3) desire to combine the factors thus disclosed into other and more perfect or interesting forms, (4) some, at least, obscure picture of the new unity or "ideal" to be reached by the mental activity; and so (5) an end, which has practical or theoretical import. For so-called *creative imagination is always teleological; it is constructive according to a plan.*

The achievements of the productive imagination range all the way from the play of children or a cook's new *ragout*, to the discoveries of the astronomer or the speculative insights of the philosopher. In all these achievements the laws of association, the limits of perception, and' the constitution of the intellect, are to be discerned. But in them all there is still an element of mystery. Even in the play of children the well-known principles of imitation and association do not explain everything. There are sources of origin that lie in the hidden depths of obscure impulse, or instinct, — the mind's forthputting of ideas, the significance and value of which are not yet objects of consciousness. It is not strange, then, that Mozart's father acknowledged "a gift of God," when his son played, at first sight, the grand organ; or that the same son afterwards could give no account to himself in answer to the question: Whence came the immortal melodies which kept sounding in his ears?

The Limits of Imagination. — While, then, we must acknowledge the dependence of the most purely creative imagination on the acquisitions and the associated revivals of past experience, it is not safe to set arbitrary limits to its inventive and intuiting functions. For the individual, however, the following three kinds of limitation must be recognized: (1) The ends sought through the act of imagination, (2) skill in analytic observation and synthetic power, (3) the insuperable laws, or ultimate forms, of mental life. Thus the man of science or the inventor is obliged to limit his imagination, as the poet or writer of fiction is not; because the end which the former desires to reach by means of the imagination is so largely different. Nature, in fact, will not submit to *merely* poetic or fictitious combinations. The man untrained in the knowledge of the objects over which his imagination is to assume control is self-limited; he *cannot* work with creative freedom and efficiency among such unknown objects. And over all our imaginings — serene, undisturbed, and eternal, as it were — preside the laws of intellectual development. We cannot imagine God, angels, past conditions or future social developments, otherwise than in accordance with those laws. *Only the assumption that the laws of our minds are indeed the forms of reality can justify the use of creative imagination in the extension of knowledge.*

Place of Imagination in Mental Development. — The relations of our picture-making faculty to the other forms of mental development — to intellect, feeling, and will — are manifold and important. There is no stimulus and guide to the imagination of the artist, or of the man of science, which is so productive as the loving and analytic observation of nature. Both artist and "scientist" are equally "true" to nature, although in different ways. But neither art nor science can attain the highest stages of development by *mere* reproduction of the results of analysis.

The relations of imagination to the development of affective and conative consciousness are also obvious. The quickening of feeling, and its warming influence over the entire mind, are essentially connected with the highest flights of imagination. Conversely, those flights themselves lift up the soul of the observer with sympathetic pleasure and aspiration. But the cultivated and strenuous will is required in the performance of the more difficult tasks of creative faculty. For they do not let fancy "run," or imagination "take care of itself." They give to the will a difficult work for its constructive achievement.

In illustration of the place of imagination in mental development — a subject which admits of illustration rather than of reduction to generalized principles — almost the entire history of art and of scientific discovery might be adduced. Thus we find certain old Japanese *kakemonos* representing the native musicians as wandering in solitary places to catch the tones which nature emits. Japanese music has never progressed much beyond the imitative stage. On the other hand, the pictorial art of Japan shows the superior excellence of the analytic observing eye, and, at the same time, the suggestive power which displays the higher type of imagination and invites the beholder to a similar constructive work.

In further illustration we may recall the fact that it is said of Balzac, he did not *copy* the two or three thousand types which play a rôle in his "human comedy"; he *lived them ideally.* And the author of "Masks or Faces?" has shown by the testimony of most of the great actors that the secret of their power is the ability so to place themselves, by imagination, inside all the characters they represent, as to live the actual life of emotion lived by those characters. Sympathetic feeling and "imaginative contagion" go hand in hand.

Kinds of Imagination. — As of memory, so of imagination, it should be said that there are as many kinds as there are principal forms of presentative experience to be pictorially represented. If, for example, the same foreign scene or distant event be described minutely before a score of persons, each will create of it a different mental picture. The world "over there" — whether it be across the ocean or across the river of death — is a different world for every traveller. The fact has already been referred to (p. 131 f.) that some persons are and some are not good visualizers, or image-makers in terms of sight. Others imagine everything in terms of words, thrown together into judgments, and scarcely at all as the vivid visualizer imagines the same things.

So, too, does every form of business or pursuit, every form indeed of mental life, have its somewhat peculiar kind of imagination. The picture-making of the man of affairs is practical; of the man of science, scientific; of the artist, æsthetical. A man cannot be conscientious and morally good, or cling to any form of religious faith, without possessing the appropriate development of imagination. A brief consideration of the more important kinds of imagination will, therefore, assist in a better understanding of this faculty.

The so-called Practical Imagination. — Nothing can be carried on to great success without a considerable development of picture-making faculty. For, as Schiller says in his "Song of the Bell," it belongs to man —

"That in his mind he ever traces
What he constructs with his own hand."

The boy who is devoid of imagination cannot learn even to construct a circle or an ellipse; much less can he overcome the inability, of which a student of solid geometry once complained, "to get his nose in behind the figure" in the book. Men who plan great business enterprises, or political or military campaigns, or who institute exploring expeditions, must have large capacity of imagination.

Imagination in Science. — No other faculty is more important than imagination for the man of science. The great constructive minds in science have been men of extraordinary talent for a certain kind of imagination. The more pure and advanced the science, the greater its demand upon mental picture-making. But there is not a law of any of the natural sciences that is not given to experience in fragmentary fashion. Constructive mind must weave the fragments together. *For every theory is a synthesis explanatory of facts by reference to an ideal principle.*

In proof of this view let what is called the "body" of any of the physical sciences be examined in detail. For example, in the histology of the nerves the ordinary text-books picture what the senses do not see, — the "scheme" or idea; and what is really observed through the microscope must be interpreted by the constructive imagination, in order to convert it into the beginnings of a science. Especially does every form of the evolutionary hypothesis make an enormous demand upon this faculty, to stretch itself through countless eras of time, and to picture processes in the wombs and brains of extinct animals, whose grosser structure is itself very largely the work of the same image-making faculty. Of it Professor C. C. Everett has said that "whether it be true or false, it is as truly a creation of the mind as the fables of Æsop, where the monkey and the fox talk together. The fable may be more fanciful, the theory more imaginative."

Imagination in Art. — "Pictures and statues are the books of the people," said St. Augustine. The truth which art sets concretely before the mind, and the constructive imagination as the master faculty in art, — these are common-places of that more popular psychology which can best tell us many things that are beyond experimental demonstration. The history of music, for example, is chiefly a history of the development of constructive tone-picture-making. Enlarged scope was given this faculty when it was discovered that two or more *arias* can be sung at the same time, with agreeable effects, if only their successive tones stand in certain relations of interval. When modern harmony succeeded counterpoint, and a vastly increased number and power of musical instruments were placed at command of the artist, this kind of creative imagination became gloriously free. In the closely allied art of poetry, the whole mind expresses itself through the channels of constructive image-making faculty. "The imagination is in a special sense the poetic faculty." Yet unless imagination is clarified by thought, the highest creative work in poetry is impossible.

It is ideas as intuited in perception rather than as suggested by other ideas, or arrived at by thinking, which are caught by the artistic mind. In general, æsthetical imagination takes its point of starting from an intuition of the ideal, as present in concrete and individual experience.

Imagination in Ethics and Religion. — Right conduct invokes the activity of the imagination; and so does every satisfying religious ideal. The sphere of ethics begins only when the distinction is made between what is, in conduct, and what ought to be. *But that which ought to be, as distinguished from what is now, or has been, must be constructed by image-making faculty.* The very word "right," in its genuine ethical meaning, stands for some sort of an ideal; and all ideals are constructions of imagination, started in experience, moved by feeling, and guided by reasoning. It is as true of ethical as of æsthetical imagination that it is essentially an idealizing process.

The alleged entities and accepted principles of religious faith are especially dependent upon the constructive imagination. All intelligent use of the words for Deity (God, "The Infinite," "The Absolute," etc.) and for the divine attributes (eternity, omniscience, omnipotence, etc.) combines, in the highest degree, the energies of both imagination and thought. No other exercise of the mind is at once more severe and more stimulating than the attempt to picture ideals corresponding to these words.

Education of Imagination. — The constructive picture-making faculty of mind cannot well be directly trained. Its training must, on the contrary, be chiefly if not wholly indirect. The old woman in Fritz Reuter's novel, who set to work in earnest to *make* some poetry, did not cultivate poetic faculty thereby. The analytic observation of nature and of human life, the reflective study of the creations of the world's most masterful imaginations, and the subsequent self-discipline which comes from facing one's own work in a critical and thoughtful way — these are the most fruitful exercises for the development of creative picture-making faculty.

[Besides the works already cited, Chapters VII and X, compare Leigh Hunt: Imagination and Fancy; C. C. Everett: Poetry, Comedy, and Duty; Joly: L'Imagination; and Maass: Versuch über die Einbildungskraft. More highly specialized treatises are such as Schmidkunz: Analytische und synthetische Phantasie; Cohen: Die dichterische Phantasie, etc.]

CHAPTER XII

PRIMARY INFERENCE AND JUDGMENT

The development of what is more specifically called "the intellect" occupies the logician and the psychologist in two quite different ways. The former aims at establishing what he considers the universal and unchanging laws, or abstract forms, of all thought. Logic is, therefore, accustomed to start with its theory of conceptions, and then proceed to show how these logical elements may be joined together in judgments; and how the judgments may be derived from one another under the principles of all reasoning. Everywhere it aims at formal exactness. The psychologist is interested, the rather, in the evolution of mental life, as this evolution takes place in all its infinite variety and concrete fulness, in the individual man. He therefore pries about the roots of mental life, in its intellectual aspect, or phase, of evolution. From the more germinal forms of intellection, he proceeds, following the natural order, to the description and explanation of the chronologically later and more complex forms.

Our analysis of conscious states has already convinced us that they must all be considered as activities of the one subject of them all, the Mind. In each of them, as necessary indeed to constitute them mental "states" ready for objective treatment, we recognize the inherent activity of discriminating consciousness. The influence of attention, fixating and redistributing the varying amounts of psychic energy, as it were, is felt from the very first. That "immediate awareness" of similarities and differences, which is not a mere matter of having different sensations and feelings, but an intellectual recognition — a primary form of cognitive action — has also already been considered. But it has been left for this and the following chapters to trace the further and later development of intellect. The stages of this development, as the psychologist elects to notice them, are not (1) conception, (2) judgment, and (3) reasoning — all definitely logical. They are rather — if, indeed, we can speak of "stages" at all, where the flow is so smooth and continuous — (1) a kind of intellection that may be called "primary inference," a mental leaping to a conscious synthesis called (2) judgment, and giving rise to (3) logical thinking supported by language, — the formulating, or crystallizing, into a conceptual process.

Going back near to the point where the development of intellect proper was broken off (see p. 48 f.), we resume by considering —

Intellectual "Assimilation" and "Differentiation." — A certain form of assimilation is implied even in the fusion and association of mental images when accompanied by the consciousness of their resemblance. In this form the process is automatic rather than voluntary, vague rather than clear, and having to do with some simple features of likeness. The clock says *tick*, *tick*, *tick* = consciousness of a repeatedly "*ticking clock*." The pressure-sensations are experienced as smooth, and still smooth, fused with temperature-sensations that are cold and still cold = the consciousness of a smooth-and-cold surface (of the marble-top table).

Let now the act of selective attention be applied successively to one feature or part after another of any complex object, with the accompanying clear consciousness of resemblance for the like, and of difference for the unlike. If this continuous and complex activity of discriminating consciousness be regarded as having its result in the conscious separating of like and unlike factors from the total object, it is called "analysis." If it be regarded as having its result in bringing and consciously fusing together, some of these factors to the exclusion of others, and so constituting a new totality, it is called "synthesis." A higher kind of *intellectual* assimilation results, as these activities of discriminating consciousness become (1) more *voluntary* and directed toward recognized practical ends, (2) more *distinct* by repetition and by the emphasis of concentrated and interested attention, and thus (3) more *complete* because involving a larger number of the less obtrusive features.

A similar process of development provides, however, for higher and more complex forms of intellectual differentiation also. Nature furnishes many severe checks or cruel punishments for over-hasty assimilation. The boy *must* early learn to distinguish between the dog that bites not, and the dog which looks somewhat like his good-natured fellow, but which, nevertheless, will bite. Nice-tasting things seem, in some respects, like nasty-tasting things; it is important not to assimilate their common features without differentiating the signs of their taste-qualities. Here, again, a more voluntary, distinct, and complete form of active discrimination results in a more highly conscious and intelligent work of differentiation.

In general, then, *all fusion of sensations and ideas into more complex forms, and all association of ideas, when accompanied by the conscious fixation of interested attention upon the resemblances and differences of objects, issues in a combined analytic and synthetic process.*

Comparison as involving Primary Inference. — Such conscious discrimination of likenesses and unlikenesses as has just been described, with its more or less permanent assimilation of the like and its differentiation of the unlike, is a kind of comparison. It is comparison as implying a sort of "leap to judgment" — a kind of crude but genuinely intellectual procedure which we have called "primary inference." Inference, in which judgment follows upon other judgment, with a clear consciousness of the "ground" connecting the two judgments, is called logical. It is a later product and requires much more development of mind. But a vague consciousness of something implied, beyond what is immediately given, belongs to that early form of mental functioning already described. The mind is even now detected, as it were, in moving from the seen to the still unseen, from the felt to the as yet unfelt, from the present to the now past or to the still future. The stream of consciousness is, indeed, started on its way from the concrete individual toward the abstract and universal. This movement differs from the *mere* flow of ideas under the laws of association. Neither is it a mere relation of change, externally brought about, between the contiguous or more remotely successive parts of the stream of consciousness.

Nature of Primary Inference. — There is no marked break in the *intellectual* development. Neither judgment, nor reasoning, nor conception, springs forth at once, full-armed, from the brain or the mind. We may perhaps put our finger on some definite point in the mental life, and say: "Just there emerged the first sensation of yellow, or the first feeling of love, or the first perception of a human face." But we can never find the exact moment when the child begins to discriminate at all, to pass the most rudimentary judgment, or to undertake the first act of primary inference.

There are no words with which to classify accurately the different stages or processes in the development of intellect, so that each one shall not imply and involve the others. Judgment, for example, implies a sort of inference; but judgment and inference both involve the formation of ideas in a way dependent upon analysis and synthesis. On the other hand, the higher forms of inference have to be described as based upon completed judgments; and logical judgments imply the formation of conceptions, or abstract ideas; while conceptions, in their turn, are the results of previous judging activity. We cannot, therefore, describe the development of intellect, as it actually occurs, by sticking fast to the logical meanings of these, or of any other similar terms.

The truth, as it will appear later on, is this: Conception, judgment, reasoning,—all the so-called logical processes,—are not to be described as actual forms of psychoses, statical conditions, or finished products, in the flowing stream of consciousness. For it is not in this way that they are experienced as actual functionings of the intellect. As the psychologist considers them, *the logical processes are rather successions of psychoses which derive their characteristics from the nature of their sequence, and from the laws followed in this sequence.* In conceiving, judging, reasoning, I do not remain still and motionless, as it were; there is mental movement in the very act of grasping together the different "*momenta*" of this mental movement. The psychologist must understand the nature and the significance of these forms of mental movement, in order to know what, psychologically considered, conception, judgment, and reasoning are.

The foregoing truth must be recognized in considering the nature of the most rudimentary form of the so-called intellectual faculties — the form which we have called "primary inference." (1) Negatively, it is *not* a mere fusion or succession of ideas; neither is it blind and non-purposeful volition. But (2) positively, it may best be described as *a relating activity, directed toward the attainment of ends, with the added consciousness of relation.* And because this activity *is* a movement of conscious mind, which passes from object to object, carrying with itself (like a bee gathering honey) assimilating and differentiating ideas, and thus forming in its own interests new and higher combinations, it is a kind of rudimentary inference. Attention focuses upon the new object, consciously bearing with it impressions of past acts of assimilation and differentiation which will determine its attitude toward this new object. A new sight strikes the infant's eye; a new sound falls upon its ear; or a strange feeling creeps over its skin. It is a challenge to attend, to come to some judgment, to answer the question: What is that? This "leap to judgment," this bringing the new under the same category with the old, — a relating activity with the added consciousness of relation, — is the essential primary activity in the development of intellect. *This relating activity is implied in "intellectual" assimilation and differentiation, and in all comparison, as these have already been discussed. They all only lay emphasis on different aspects of this one relating activity.*

The nature of primary intellection, and the factors and stages of intellectual development, have been differently described by different psychologists. But by all who do not solve the problem by denying the facts, the essentially conscious and active character of all genuinely intellectual relation of objects is acknowledged. Thus Volkmann describes judgment as a kind of voluntary "*non-suiting* of the fusion of two ideas which is necessary in order to raise the fusion, as such, into the position of an object of consciousness." Lotze, too, speaks of judging as "a second and higher consciousness," "a new manifestation of psychic energy." M. Paulhan maintains that judgment involves the separation of psychic elements which have, in fact, fused together, and their combination under rational forms; it is "the act by which an abstract element of a complex idea is re-attached to a new system of elements." Ideas no longer *become cemented;* the "cement" of the ideas is now no other than the attentive, comparing, and synthetic activity which is called primary intellection.

Rudimentary Judgment. — This same relating activity comes to a sort of conclusion or pause in the formation of the most rudimentary kind of judgment. Indeed, considered as movement in the stream of consciousness, the result of this activity *is* a completed act of judging. If we consciously assimilate two visual objects as like, by moving the point of regard from one to the other and, at the same time, carrying the fading image of each over, as it were, into the perception of the other, we pronounce them alike. This pronouncement is a judgment. If set into any form of reality by language or by other motor activity, it is a proposition and signifies a sort of finished experience. Considered as a purely mental affair — so far as we are able thus to consider it — judging is a conscious bringing of objects or ideas into relation with each other, by the focusing of attention upon their resemblances or differences, until the unifying and relating consciousness has become an established fact.

For example, I take two flowers **A** and **B** in my hands; or I approach the building **M** with the intention to decide upon the character of its architecture. I look first at **A** and then at **B**; I look frequently back and forth between the two. Finally, I affirm certain relations, and deny others, as existing between the two. But this final judgment is itself due to an indefinite number of other acts of judging through which I have been passing all the while during my attentive examination of **A** and **B**. Something similar is my experience while on the way to the conclusion that the architecture of the building **M** belongs to the class **X**.

The truly psychical activity of judging is doubtless very subtle, rapid, and difficult to distinguish by direct application of self-consciousness. This makes the psychological nature of judgment difficult to discover, and to describe accurately and completely. For judgment is essentially *objective.* Its very nature consists in bringing *objects* into relation, under fixed forms of relation; therefore it has little conscious regard to give to the mental processes involved in this act of bringing. It has even less regard for the significance of the forms under which it accomplishes its act of synthesis, — the forms of its objects as determined by, and as determining, the forms of its own development. Enough has already been said, however, to warrant certain preliminary statements which will be made more clear later on: —

(1) *Judgment is a conscious mental synthesis, a unifying act;*

(2) *This synthesis unites two successive portions of the stream of consciousness, with an added awareness of their being objectively related.* It is mentally affirmed that the two belong together, as in some sort one; but

(3) *These objective relations into which the synthesis of judging brings the successive portions of the stream of consciousness may be understood either as the "laws of intellect" or as the "forms of things."*

Processes involved in the Development of Judgment. — The life of our intellect grows by maturing, correcting, and connecting its judgments. The "intellectual man" is the man of rapid, precise, manifold, and logically interrelated judgments. It is what we *become* capable of doing through activity of the so-called intellect which marks off this power of mind from other cognate powers. In the development of judgment four forms of conscious activities may be distinguished. These are (1) Comparison, (2) Identification, often so-called, (3) Generalization, and (4) "Storing" by attribution of some symbol, or Name, to the object constructed as the result of the first three processes. All these acts are themselves extensions of judgment, based upon the growth in complexity of experience. They are made necessary in the attempt of the intellect to handle this ever-increasing complexity. It belongs to the very nature of all our *intellectual* development, more and more to pass judgment upon what we and others are about; and, as well, upon what we and others ought to be about.

Judgment as involving Developed Comparison. — We have already seen how comparison, considered as the bringing of objects together in consciousness, with the added consciousness of their resemblance or difference, is a primary activity of the intellectual life. But in developing our judgments we compare the objects of perception over and over again, and from more manifold and higher points of view.

For example, the flower **A** is blue and the flower **B** is yellow; as respects color, the unthinking child and the scientific botanist both refuse to unite **A** and **B**, under the idea of color-resemblance. **A**, when we turn to it from **B**, is seen *not* to be like **B**'s color-image; it is judged *not* to resemble **B**. This, however, is the limit of the child's comparison and the end of its judgment relating the two flowers. But the botanist compares the stamens, pistils, and leaves, etc., of **A** and **B**, judging yes, or no, in respect of the problem of likeness; and finally, he leaps over all the manifold differences of the two and pronounces a judgment of specific or generic likeness; or even of a more important connection. For, behold! he has discovered in **A** an hitherto unknown species of the genus **X**.

It appears, then, that *the development of judgment depends upon increasingly elaborate comparison; while comparison itself involves repeated acts of at least the more primary kind of judgment.*

Judgment as Identification. — No two objects, no two complex states of consciousness, are precisely alike. If they were precisely alike, they could not be discriminated as *two* and yet, at the same time, identical. But the intellectual mastery of the bewildering complexity of experience demands that objects which discriminating consciousness presents as *sufficiently similar* shall be in thought identified. What is to be taken as "*sufficiently* similar" depends upon the points of view from which the process of comparison sets out, and upon the ends which it desires to reach. The act of judging which disregards the unimportant differences of two or more objects, and, seizing upon their selected resemblances, unites the similar as though it were the same, is an important function of the developing intellect.

Let us recur, for illustration, to the examples already chosen. Suppose that the flowers **A** and **B** appear, when compared, similar in color; they are both red. In fact, however, they are not *precisely* similar; for one is a darker, and the other a lighter, red; or one is a yellowish, and the other a bluish, red. But as measured by the potency of the discriminating consciousness employed, and according to the end designed to be served by the comparison, they are "*sufficiently* similar." Then the judgment, or mental synthesis, which terminates the comparison, *identifies* them *in respect of* their color-quality. **A** and **B** *are — both* of them — *red*. It is thus that similar sensations, or ideas, or complex objects, are made ready, so to speak, for a common title, which may be affirmed of all alike as identified in the synthesis of judgment. Consider, further, the more complex problem of judging the architecture of the building **M**. Repeated acts of comparison of the perceived building with remembered complex ideas of different forms of architecture — Romanesque, Gothic, Romano-Gothic, etc. — end in the judgment identifying **M** with other buildings under the predicate **X**: "This cathedral (**M**) is pure Gothic (**X**)." But each of these repeated acts of comparison was itself terminated by a synthesis which either affirmed or denied the identification of the particulars (the **a**, **b**, **c**, **d**, . . . **m**) of **M** with the complex elements (the **q**, **r**, **s**, **t**, . . . **x**) of the predicate suited to the whole (the columns, arches, towers, mullions, etc., belonging to architecture called Gothic, or **X**).

Thus do discreet individual experiences get apprehended as actually having something in common. This common thing is *the* quality **X**, or *the* relation **Y**,—the quality or relation *belonging to* them all. So far as *it* goes, *they* are "identical." This process of obliterating the particular mental existence of ideas, and of binding them together by judgments of comparison, gives to our individual experiences a secondary and symbolic character. *When the individuals, which are in sense-impression and idea merely similar, are judged to be really identical, the intellect has made unities out of them which are of a different order from those unities formed by the fusion and association of sensations and ideas.*

Judgment as resulting in Generalization. — Already the significance of "universals" in the development of intellect has begun to appear. The child who mentally affirms "**A** is a red flower, and **B** is a red flower, too; they are both red," does not, indeed, mean to judge a class-quality (the redness) as belonging to these individuals. Doubtless, this so-called "class" qualification is a fiction which logic appears to force into the interpretation of the consciousness of the child. And just as undoubtedly, the botanist who, in spite of difference in color, and of many other obvious differences, between **A** and **B**, identifies them as belonging to the same species or family, consciously means something more than the child means. But the germ of what the botanist's judgment means to him, and means to us, is in the judgment of the child. The child is "going to" generalize, is "going to" classify. This is because *its judging acts are going to bind the individual items of its experience into higher and higher unities.*

Generalization and classification are plainly the same mental act regarded from two points of view. When several objects are judged to be possessed of one or more attributes, or to stand in one or more relations, common to them all, the judgment is said to be a "generalization." Any of these objects, taken separately, or any new object, which is judged to be possessed of these same attributes, or to stand in these same relations (whenever the judgment involves a conscious reference to other objects), is said to be *classed* with them. The set, or system, of judgments binding together the individuals into a community of like-constituted things, is called "classification." But in this elaborate form such development of judgment implies thought and language, already far advanced.

Results of Judgment retained by Naming. — It has just been said that language, as storing and supporting our thinking, is implied in all the more elaborate processes of generalization and classification. But some sort of a motor symbol seems necessary to "store" and to "support" even the less elaborate developments of judgment. Having arrived at the synthesis of many individual experiences, in the shape of something common to them all, we require some means for ready recall of the results of this synthesis. Many such results become recorded in the habitual activities of body and mind, as we quickly and almost unconsciously adjust ourselves to an ever-varying environment. The work of intellect in learning to walk is stored, not so much in recognitive memory and conscious judgments, as in the automatic and reflex activities of the brain and spinal cord. So it is even with the use of the language necessary to generalization and classification.

Among the generalizations stored in the way of motor activities that are not accompanied by a corresponding consciousness of relation, there are some which serve as means of communication between men. But the essentially *human*, the convenient, and often the only successful way of conserving and using the results of judging, is to give *names* to things and to their attributes and to their relations. We — that is, you and I and others — have noticed similar features or modes of behavior in different individual objects of perception; we have compared carefully and identified the similar as, to our intents and purposes, the same; we have virtually recognized the universal in the particular. How now shall we record this experience so as to avail ourselves of its acquisition, to communicate about it with others of like intellect, and to acquire further knowledge on the basis already laid? Go to! let us give it — the thing, the quality, the relation — a Name.

But before we discuss the later developments of intellect as involving elaborate thought and the use of language, let us consider —

The Forms of Judgment. — There are as many forms of judgment as there are forms of the synthesis, or unifying *actus*, of consciousness in the process of judging. For the so-called "forms of judgment" are nothing but this — the different ways of one essentially the same intellectual activity in consciously relating the different items of experience. But since judgment is always, from the psychologist's point of view, a time-occupying process (judgment, psychologically considered, = judging), we may reaffirm this truth (see p. 264): *The synthesis of judgment is accomplished by an act which determines the flow of the stream of consciousness in such manner as to unite two successive portions of that stream, with the added consciousness that these particular two portions "objectively" (or "rightly") belong together.*

It is the task of logic and of the theory of knowledge to discuss the doctrine of the fundamental forms of all intellectual activity in judging. Psychology may, however, note the following three: (1) Synthesis under terms of *resemblance* or *difference*. Here certain points of likeness in the objects of perception or of imagination must serve as points of starting for the mental movement in the act of judging. We do not bring together in judgment — not even in order to pronounce a negation of their "belonging together" — things which appear utterly unlike. To judge, for example, that "an asymptote is not in the key of **A** minor," would be to "play the fool" with intellect rather than to use it. (2) Synthesis under terms of *time* and *space* furnishes the forms which all judgments may take that result from comparing events as occurring in succession, or things as having quantity and number. But there is a third form of judgment of which logic has taken almost no account, and upon which psychology has hitherto bestowed far too little of its attention. It is that (3) synthesis of judgment which attributes *action* to an *agent*. From the very earliest dawn of truly intellectual life to its close, the mind's chief interest centres in the behavior of persons and of things as affecting its own welfare in a practical way. It is what this particular thing, or that particular person, *can do*, to hurt us or to help us, and what we *can do* with each person or thing, that elicits and absorbs the average man's intellectual energies.

A word more is needed sufficiently to emphasize the objective and practical character of the great majority of our judgments; and, especially, the predominance of the third of the above mentioned forms of synthesis. The first thing which the child must learn to judge is just this: What behavior in relation to my own pursuit of ends must I expect from this or that thing? It must learn to pass, *from* seeing the steam rise above its cup of milk, *to* the judgment: "that particular cup of milk will burn me." For the child, the judgment "steaming-milk-is-hot" is not so much an affirmation of quality objectively belonging to a subject; it is rather a conscious attribution of a form of action to an agent. The reflective doctrine of the so-called "category" of quality shows that the infant is more truly philosophical than is the average writer on logic in his treatment of the same experience.

But in connection with the process of naming, the development of judging faculty proceeds, as a series of judgments is formed which synthesize many similars as the same. For example, M. Taine describes an infant of eighteen months, who had been told when her food was too hot, or the sun was warm, or the candle near, etc. —

"*Ça brûle.*" She had also been accustomed to play hide-and-seek with her mother, calling out "*Coucou.*" On seeing for the first time the setting sun disappear behind a hill, she exclaimed: "*A b'ûle coucou;*" — that is to say, "That-which-burns" (the agent) "is playing hide-and-seek" (acting as I do when I call out "*coucou*").

But we have already carried the development of intellect farther than it actually goes, in the case of normally constituted persons, without invoking the aid of language. In passing to the topics of the next chapter, however, it must be remembered that no sharp transition is indicated in the actual development of mental life.

[References to works on the psychology of the intellect, will be found at the end of the next chapter.]

CHAPTER XIII

THOUGHT AND LANGUAGE

If one is seeking for a single term which will best summarize and express the essential points in all the more elaborate processes of the human intellect, one finds such a term in the word "Thought." Whenever we think, we are *reasoning*;—that is, we are passing from one judgment to another with more or less consciousness of the "reasons" or "grounds" which determine the order, in dependence, of the successive judgments. We are, besides, both making use of *conceptions* already formed and also forming new conceptions. And, finally, the one essential and prominent thing about all thought is this: we are *judging*, and then judging—always exercising that peculiar relating activity, which sums up and terminates the accomplished process of discriminating consciousness. Reasoning, conceiving, and judging,—all three,—are, then, allied forms of the functioning of thought-faculty.

If what has been said in previous chapters as to the continuity of intellectual development be kept in mind, there is now no objection to assuming in our discussion the order of topics customarily followed in logic. We shall treat then, of Thought as (1) Conception, (2) Logical Judgment, (3) Reasoning.

First of all, however, let us get a properly fixed point of starting by reconsidering—

Thought as entering into Complex Perceptions.—It has already been made clear that an elaborate activity of discriminating consciousness is implied in all "immediate awareness" of external objects. It has also been shown that objective judgment (sometimes called "perceptive judgment") is involved in all maturing of the perceptions of sense. It should now be noticed further, that *more or less elaborate processes of thinking often take place so rapidly as that the judgment in which these processes terminate appears in consciousness as a perception.* This accords with that view of the perceptive process which regards it as "solving a problem," so to speak, by passing from a basis of more or less doubtful sense-data to a genuinely intellectual conclusion.

To illustrate this important truth let us suppose three persons — one a stranger, one the owner of a house in a certain city district, and one the chief engineer of the fire department — to hear the same succession of sounds (a bell strikes five times with relatively short intervals, then pauses, then gives four more strokes with the same short interval). All three persons have heard a succession of sounds which are the same as respects intensity, timbre, apparent direction, etc. But how different are the *perceptions* of the three, if by this we understand the final attitude of mind toward a series of sensory modifications of consciousness! The stranger can simply affirm that he has perceived (experienced a succession of acoustic sensations, S^1. S^2. S^3. S^4. S^5. —— S^6. S^7. S^8. S^9., which he judged to be) a "bell-striking-nine-times"; has felt curious, has thought nothing more about it. But the house-owner has perceived *his*-fire-alarm-signal; has felt greatly excited and has seized his hat to run home; because he has judged: "My house is perhaps on fire." While the engineer has perceived "alarm-for-corner-of-A-and-B-streets"; has felt cool and collected; because he has at once judged, — "Not at all a dangerous district," and "plenty of water on hand."

Experiences similar to the foregoing may serve to remind us how those intellectual activities which spring from, and often fuse with, what we call perception by the senses are a kind of tangle of conceptions, judgments, and acts of reasoning. The truth is that our actual experience is rarely, or never, *purely* of the kind which the logicians are accustomed to indicate by any one of these words. It is an experience of thinking, to be sure; but thinking, as it is ordinarily accomplished, includes all three of these forms of intellectual life. The greatest, and the most essential one, of the three is — *Judgment, regarded as a synthesis determining the character of the succession of our conscious states in accordance with specific forms of relation.*

Hegel declared that to affirm "a carriage is passing the house" is not a genuine judgment unless there is a question, "whether it is a carriage or a cart," etc. The truth in this somewhat perverse declaration has already been acknowledged in our study of perception. It would seem more correct to say that there is a certain kind of inference, or leap to judgment, involved in every such affirmation. Note here our mental attitude when we *pause* in the process of sense-perception, and take a bit of time to "make up our mind." This attitude is very significant. What *is* this noise I perceive — is it the watch under my pillow or the click of my heart valves? *Not* the latter, *but* the former; *because* it is too rapid, and has such an intensity, timbre, etc. In all elaborate perceiving of new objects, so as to assign them a place in the system of our experience and a name, the same thing takes place in more highly developed form. Perception thus becomes a leap *from* judgment *to* judgment. In this manner the natives of the Pacific Islands perceived the goats which Captain Cook brought to them as "horned hogs"; and the horse as a "large dog."

Thought as Logical Conception. — The "freeing" and "schematizing" of the ideas, and the formation of the beginnings of a system of judgments, are the necessary conditions for the more elaborate processes of conception. Add to this the modifications which ideation and judging go through on account of the use of language, or of other accredited symbols of past intellectual processes, and we have what the psychologist must recognize as the characteristics of the concept. *Psychologically considered,* *conception is a union of the reproductive function of consciousness with the thinking function — the essence of the latter being the act of judging.*

A conception, as logic employs the word, may then be called an "intellectualized idea," or a process of ideation as it has been modified by being repeatedly made the subject of judgments about it. This is no longer the idea which best resembles its one original, because it is vivid, lifelike, and referable to that one original. It is the idea as adapted to be used in a great variety of judgments about things that are "sufficiently like" to be considered under the same general forms of relation. It is a conception; because it is not a *mere* mental image bound down, in its work of representation, to the memories or judgments pertaining to an individual experience. It is by thinking that this modification of our ideas is accomplished.

Nature of Logical Conception. — Logic speaks of the nature of the concept as though it were a statical affair — an entity, at least of a psychical character, that can be caught, examined, and found to have its nature determined by its "marks," its "intension" and "extension," its "potencies," etc. But psychology, from its point of view, can only regard this experience as a certain process in consciousness (an activity of conceiving rather than a finished product, called a concept).

Psychological investigation shows that by the "nature of the concept" is meant the way in which the schematized ideas are thought together under the different forms of that relating activity which is called judgment. Conception is a movement of thought, whose terms consist of a relatively few and highly schematized ideas.

The proof of the two italicized sentences given above comes from our experience in the actual process of conception. Every individual intellect has its own concepts; and the growth of every intellect both causes and depends upon a constant change in the character of the conceptual processes. Moreover, these general facts may be illustrated in the case of all individuals by experimenting to determine precisely what are the thought-processes with which each mind responds to the stimulus of a class-name. For example, let twenty persons be told to conceive of — say "a lion"; and to report the actual character of the stream of consciousness in passing through this process called conception. There will result twenty more or less different responses actually given by the twenty persons. These differences, however, will all be resolvable into two kinds: (1) differences in the ideas (for example, a visual picture of glaring eyes and lashing tail, or an acoustic image of a roar, or a word-picture of "quadruped," "vertebrate mammal," etc.); and (2) differences in the succession of judgments pronounced ("fierce," "strong," "dangerous," "lives in a jungle," "is carnivorous," etc.). In all cases alike the meaning of the class-name will be thought out in a series of more or less highly schematized ideas united by continual acts of judging. But the process of "thinking out" the meaning of a class-name *is* the process of logical conception. Such a process, or series of consciousnesses, may equally well be called "conceptual thinking."

As different individual minds approach each other in the general character of their experience and training, their conceptions become more nearly alike. Growth of knowledge in the race, moreover, tends in the direction of a certain enlargement of recognized agreement regarding the judgments that *ought to be* pronounced about individuals which are largely or essentially alike. Hence arise so-called scientific definitions — or guides to the proper judgments about all individuals that appear to be, or are imagined to be, "sufficiently similar." But the whole history of scientific development demonstrates the same truth; scientific development itself consists largely in the enlargement and correction of the generally accepted conceptions — or modes of relating by judgment the schematized and symbolized ideas. The belief that there are fixed psychical entities answering to the word-names for different classes of objects is, then, a fiction due to the unreal and lifeless way in which logic and philosophy have dealt with the doctrine of the concept. To accept this doctrine results in one of the very worst of the psychologist's fallacies. In rejecting it, however, one must not go over to the other extreme of denying to the mind all power of genuine *thinking*, as distinguished from the mere having of associated similar or dissimilar concrete and lifelike representative images.

Few subjects have been more debated for centuries than the nature of the concept. Three views have been historically distinguished: these are the "realist," the "nominalist," and the "conceptualist." The first of these, in so far as it maintains some sort of a non-mental existence for the concept, has no place in psychology. The nominalist view, in denying, as did Berkeley, "that I can abstract from one another, or conceive separately, those qualities which it is impossible should exist so separated;" and in claiming that whenever the name of a class is used intelligently, the "mind must have before it some individual object either perceived or remembered;" misconceives both the nature of judgment and the changes produced in the ideation-processes by intellectual development. The conceptualist view, in its description of conceptions as though they were statical products of mind, or psychical entities, is equally faulty. It is the nature of the processes which go on in consciousness that needs to be observed. The characteristics of this nature are such as they have already been sufficiently described.

Thought as Logical Judgment. — Those mental processes which have just been described as constituting the nature of conception react, in turn, upon the nature of judgment. The reaction results in raising judgment to a second and higher stage, as it were. Because I have already judged, or know, a lion to be a "mammal" or a "carnivorous animal," I may unfold the conception of a lion by repeating these and other allied judgments. But suppose some *new* object is presented to the mind and the problem is proposed to thought: "*What is it?*" In answering such an inquiry I must, as it were, apply a number of conceptions, already framed, to the new object and thus try *to think it under* them. If I succeed, I answer the problem with a new and higher kind of judgment: "*It*" (the thing about which the question, What is it? was just raised) "*is a so-called A*" (or, "It is not B").

For the sake of clearness take an example: I perceive an animal which is *like* a tiger, but which is *not* a tiger, because it is not "sufficiently" like; now, What is it? I incline at first to judge: "It is a tiger." But, stop! This animal is not so extensively white on the under side of the belly as is the tiger; it is brownish yellow above and faintly striped along the sides, but it lacks the black bars of the tiger on its bright orange-yellow ground. It is an animal; it is a quadruped; it belongs to the feline genus; it is more like a tiger than it is like any other species in that genus; but it is not sufficiently like to be called after the name of tiger. Let us sum up all the results of these processes of reasoning and conception in a single judgment and thus give to this thing a name, by which we may all designate and remember our conclusion: "It *is* a jaguar."

Such activities of intellect as the foregoing show us that *the secondary and higher judgments in which thinking terminates accomplish a synthesis between conceptions, or those condensed results of past judgments which are already familiar to us and have previously been fixed by names.* They are judgments uniting conceptions which are themselves the products of more primary judgments. Such intellectual achievements may, therefore, be called "logical judgments." They, in their turn, give birth to yet more elaborate or correct conceptions (as the "conception of a jaguar" — in the example above).

Terms and Kinds of Logical Judgments. — Psychology has its own way of considering what grammar and logic call the "subject," "predicate," and "copula" of every judgment. By the term "subject" it understands that thing as perceived or conceived, from which the synthesis in judging starts. By the "predicate" it understands that idea which, following later in the stream of consciousness, is united by the synthesis of the judging act with the so-called subject. The "copula" is the term which calls attention to the fact of synthesis itself. As Bosanquet has said: "The copula, which in judgment is merely the reference that marks predication, and has no separate content, becomes, in the proposition, an isolated part of speech."

The psychological doctrine of judgment does not need to take account of the kinds of judgment which logic so carefully distinguishes. This is true even of the distinction between affirmative and negative judgments. For by "negation" is not meant the same mental process as the mere affirmation of difference. Negative *judgment* is, in its very nature, a positive unifying act of intellect; it is the settlement of a problem for thought by a positive affirmation; in it, too, we recognize the true synthetical nature of all judgment.

Thought as Reasoning Proper. — We come now to consider that secondary and higher development of inference which is, like the secondary and higher development of judgment, sometimes called "logical" reasoning. *This kind of reasoning may be defined as the conscious establishment of a recognized relation between logical judgments.* We note in it (1) the relating activity of intellect as effecting a synthesis of judgments which have previously not been thus related; and also (2) an added consciousness of the "reason" or "ground" on which this newly established synthesis reposes.

When such a form of intellectual activity is more carefully analyzed, the passage between the two judgments which are somehow "concluded together" in a new judgment, is seen to be effected "by means of" something common to both. This *means*, or mediating conception, is then spoken of as a "middle term." There are other ways, however, of expressing the results of such an analysis; — for example, by emphasizing the meaning of the words "because" and "therefore." In the first case, I think of myself as passing to the conclusion (or coming to think) that **S** is **P**, though the middle term **M**, which belongs to the two judgments: "**M** is **P**," and "**S** is **M**." In the second case, I find myself judging (or thinking) **S** to be **P** *because* I know that it is **M**, and also that this **M** is **P**. Or, once more; — knowing, as I do, that **M** is **P**, and happening to think that **S** is **M**, *therefore* I pass to the judgment: "**S** is **P**."

Nature of Logical Reasoning. — Psychology needs only to lay emphasis upon the following four considerations, in order to set forth its doctrine of the nature of this higher and secondary form of reasoning: (1) *The reason or ground of every conclusion resides in the so-called premises only as these premises contain some mediating conception.* Something common — so that they are comparable as respects qualities, modes of action and interaction, space or time relations — is assumed to belong to all things about which we can reason logically. (2) *It is the consciousness of this "relatedness" of things, as perceived and conceived by us so that old judgments about them can afford "grounds" for new judgments, which emphasizes the higher development of intellect.* From the point of view of actual intellect, "we relate" them; from the point of view of passive experience, "they appear" to act as related; from neither point of view is their "being in relation" a mere dead matter of fact, as it were. (3) *The precise character of each relation thought is determined by the ends of knowledge.* Every man reasons in order to know something about men or about things. What he wants to know will determine his hunt after, and his selection of, the middle terms. *What kind of* a man is this I have just met? Good to do business with, or the opposite? Safe to trust as a friend, or the opposite? As has been well said by Professor James: "**P** overshadows the process from the start. We are seeking **P** or something like **P**." (4) *The intellect can understand the world only as a system of related beings which are ever — each one — doing something and having something done to them, — in more or less uniform and intelligible ways.* This is the persuasion which virtually gives confidence to our intellect in all its work of reasoning. But to examine it further does not belong to psychology.

The interesting and much debated question, Whether the lower animals *think*, can be answered only in the light of the foregoing distinctions. That they make many shrewd discriminations, cunningly adapt means to ends, learn by experience, and even intelligently modify their instinctive habits of action, there can be no reasonable doubt. But that they recognize the value and significance of middle terms, have the consciousness of one judgment as affording *reasons* for another, conceive the conclusions of ratiocinative processes as serving the ends of knowledge, and even vaguely sense the universal "relatedness" of things, it is difficult to believe, much easier to deny.

For example, shall we believe that the spider which Mr. Romanes describes as employing an ingenious and elaborate system of guy-ropes and haulings, in order to raise a fly, actually went through conscious processes similar to those of a mechanical engineer in solving a similar problem? This overtaxes our credulity. For if we go over to the point of view necessary for an affirmative answer, we raise at once the humblest of our brethren among the lower animals to a pinnacle of reason much higher than that on which we are ourselves standing. Indeed, in many such performances of the animals as that of the spider, with every increasing manifestation of intelligent skill, the likelihood of a consciousness of reasons diminishes. It is in being *conscious* of what he is about, and of what he ought to be about, in the *awareness* of the ends and reasons of his own conduct, and of the behavior of things, that the human infant early comes to surpass the most surprisingly intelligent of the lower animals.

Kinds of Logical Reasoning. — The logical classification and discussion of the differing ways of thinking out conclusions do not greatly concern the psychology of reasoning. Since the essential thing about the intellectual processes involved in them all is the connecting of one judgment with other judgment, with an added consciousness of the character of the connection (a consciousness of judging "upon grounds" or "according to reasons"), the different orders of relation under which the connection is made may serve as a principle of division. These have already (p. 269 f.) been recognized as chiefly the following three: (1) resemblance or difference; (2) space and time; (3) action and agent.

(1) Objects which are known to have one or more important characteristics in common with a third class of objects may, "with reason," be concluded to be sufficiently like to be thought together and given a common name. *If* **S** *and* **P** *are both like* **M**, *then they are "reasonably" concluded to be like each other and entitled to be called the same. There is reason for putting them all in one class.*

(2) All objects of sense-perception necessarily exist in relations of space and time; and all events in the stream of consciousness and in the world of things exist in relations of time. These relations, as perceived or imagined, afford a system of affirmative and negative propositions applicable in all possible particular cases. Such propositions are "grounds," or "reasons," for conclusions. The general principle here is "the apprehension of connections in space and time." In such chains of reasoning, **S** *and* **P** *are concluded under a particular relation of temporal position, or of magnitude or number, through their common relation to* **M**, *which is comparable to both.*

(3) It is under the form of judgment which attributes action to an agent that all our logical inferences along the line of cause and effect originate and develop. Concep-

tions of "force" and "law" are involved in this kind of reasoning. Conclusions involving these conceptions are the most frequent and important, the most popular and universal, as well as the most fundamental, in every form of science. From our past experience with things and with minds, as behaving in more or less uniform manner and always "doing something to one another," we argue our way to the future in time, to the distant and unseen in space, and even to the *scarcely* conceivable, by way of theory and hypothesis. Thus *every perceived change*, **P**, *is inferred to be due to the action of some agent* **S**; *for the reason that* **M**, *which is the known common sign of* **S**, *is connected with* **P**; *therefore*, **P** *is a case to be attributed to* **S**.

From the time of Aristotle downward repeated attempts have been made to state satisfactorily the nature of the *bond* existing between premises and conclusion, and so making the latter "valid." Aristotle's own law is the well-known *dictum de omni et nullo:* "Whatever is affirmed or denied of a class distributively, may be affirmed or denied of any part of that class." Kant stated the law thus: *Nota notae est nota rei ipsius.* Leibnitz, in a less satisfactory way, would have us accept the principle, *contentum contenti est contentum continentis.* All these forms of stating the principle, — of which Kant's is the best, — over emphasize conclusions coming under relations of resemblance and difference. Of all kinds of argument, however, that which treats this kind of relation chiefly, is most uncertain of its conclusions.

The neglect of the psychological truth that the relations of action and agent, and of different agents as "acting upon" each other, are most obtrusive and essential, has led nearly all treatises on logic into paths quite foreign to those in which walks and runs the living, energetic intellect of man. This intellect wants to classify indeed, and to be capable of a certain amount of accurate reckoning in terms of space and time. But not this supremely; or even chiefly. It wants rather to be able to *conclude* how the objects of experience — things, animals, and fellow-men — are going to behave as affecting their relations to itself and to one another. Men's daily acts of reasoning are chiefly "dynamical." In spite of its effort to be less anthropomorphic, and no longer to regard nature as a system of self-active but related individual agents, modern science moves more and more along the same line of argument.

It is not necessary to give in detail the psychology of the logical distinctions between "enthymeme" and "syllogism," or "major premise" and "minor premise." The enthymeme has been well defined as "an argument in the form in which it would naturally occur in thought or speech." This is because it puts the predicate into connection with the subject as a problem, which has been solved by the discovery of a "reason why." "Is **S** to be called **P**, or not?" "Yes: **S** is **P**, *because* it is **M**." In many cases of the actual operation of the intellect, the introduction of the concealed major premise gives an artificial and even a fictitious character to the whole procedure. In not a few cases such a major premise is found to be nothing less than that law of the intellect which governs all particular cases of logical reasoning (see p. 281, no. (4)).

The psychology of *mathematical reasoning* is worthy of a word of explanation at this place. Much calculation, even of a seemingly elaborate sort, is not reasoning at all. Thus the tradesman of Japan will tell you the amount of your bill, by means of his *Soroban*, with great rapidity and accuracy. But his is no more a true *mental* arithmetic than are the movements of the fingers of a banjo-player. The simplest act of real counting, however, involves a relatively high development of both imagination and intellect. And as Kant was fond of affirming: you cannot cognize a "straight line," unless, by an activity of imagination guided by an ideal, you construct it. It is on the basis of such constructs of imagination and thought that genuine mathematical reasoning proceeds; and its procedure calls forth essentially the same logical activities that enter into every kind of logical reasoning.

Induction and Deduction. — Somewhat long-drawn-out processes of reasoning have customarily been distinguished by writers on logic, as of two kinds, — inductive and deductive. And many puzzling questions have been proposed as to how these processes could be made "perfect"; or even as to how they could actually come to a successful end at all. From the psychologist's point of view there are two important principles which throw light upon the real nature and efficiency of both these kinds of elaborate reasoning.

First: *Induction and deduction are, psychologically considered, in principle essentially the same; both alike consist* *in reaching some particular new judgment in the form of a conclusion, by use of other judgment as its reason or ground.* Among writers on logic Bosanquet has perhaps recognized this principle most clearly. He affirms that "the distinction . . . erroneously described as a distinction between Induction and Deduction is chiefly a distinction of *aspects*." In induction we start from observed likenesses or unlikenesses, of quality or of behavior, in individual cases. We solve our problem by concluding that the reason for these observed particulars is to be found in some general or universal relation among all "sufficiently similar" individuals. In deduction, on the other hand, we start with an assumed solution of the problem which is offered by the individual case. We then conclude the correctness or falsity of our assumption by relating the individual case to some principle regarded as already "sufficiently established."

Second: *There is always a certain amount of hypothesis, or unverified assumption, in both our inductive and our deductive arguments,* — especially as applied to the real objects of experience. The logician's *perfect* induction is not to be had. *Strictly universal and indubitable* principles, from which we may infer with *absolute* confidence a conclusion to *all* individual similar cases, do not belong to the possessions of the human mind. The word "sufficient," whether as applied to like qualities and causes or to the reasons for an inference, is a sort of ironical embodiment of the truth. What amount of likeness is "sufficient" to warrant classifying two beings, or two cases of agents in action, under the same class? What amount, or cogency, of reasoning is "sufficient" to compel, or to warrant, any given conclusion? That depends—always upon a variety of considerations, which neither psychology nor logic is wholly competent to handle. A practical sufficiency is worked out, with much mistake, disappointment, and yet with progressive approaches to satisfaction, but only in the life of the individual and of the race.

Much subtle discussion has been indulged in by writers on logic over the question, How can knowledge grow by inference at all? Until I have observed every case of an $\mathbf{M}$ $(\mathbf{m}, \mathbf{m}_1, \mathbf{m}_2, \ldots \mathbf{m}^x)$, how can I be sure that *absolutely all* **M** is **P**? The answer to this, from the point of view of the analyst of human consciousness, is the frank confession: I never can be sure as a matter of *mere* logical argument. So, too, when I sceptically examine my most cherished major premises in the form of so-called universal laws, I am apt to come across startling exceptions. This is true even of the law of gravitation; for it is not merely some alleged and extremely doubtful case of "levitation" under spiritualistic influences, but the observed star 1830 Groombridge, for example, which seems to contradict this law. In all the workings and highest achievements of the human intellect we find what may properly be called a certain amount of assumption, or "concealed hypothesis." In fine, all conclusions are themselves only more or less highly probable hypotheses, according as they stand related to the entire organism of experience, under the laws of intellectual life. No form of applied science whatever can exhibit any system of laws which are based on an examination of all actual, not to say possible, cases, and which are known empirically to admit of absolutely no exceptions. Indeed, in every science, it is the exceptions which are most interesting, most provocative of research, most conducive to the discovery of new truths. The history of the advance of every science seems to emphasize the hopelessness of the attempt to find a system consisting of a few formulas which, by being based on perfect inductions and by being used, with perfect success, for all deductions, shall unlock the mysteries of the universe. If, then, the universe *is* a perfectly "logical" affair, it seems likely to baffle our attempts to *know* it by perfectly logical processes.

The development of intellect cannot be thoroughly understood without taking into account the influence of language upon the processes of thought. In the following brief account of this influence, however, our point of view must be *psychological* rather than philological or philosophical. From this point of view let us consider, first, —

The Nature of Language. — The psychological answer to the inquiry, What is language? may be expressed in the following definition: *Language*, in the most general meaning of the word, *is any conscious modification of the motor organism which is adapted to serve as a common "sign" or "symbol" of conscious processes.* The fuller meaning of the definition requires notice of the following particulars: (1) Every conscious process — especially when it attains a certain intensity of psychic energy — tends to express itself in modifying the motor organism. The same general principle has been shown by the "dynamogenetic" value of ideas, and by the feeling of tension and strain connected with the repressed tendency of the motor centres of the brain to overflow and to send motor currents to the appropriate muscles. The theory which finds the physical basis of emotion in the "unorganized surplusage" of cerebral excitement; and, indeed, the entire view taken of the dependence of our experience, as "*of reality*," upon the activity of the muscles, points in the same direction. (2) The only conceivable means of communicating conscious processes is through some modification of the motor organism employed as a sign or symbol. (3) The fixing of such "signs" in definite ways proceeds in some measure parallel with the compound process of schematizing the ideas and of forming judgments which include in their terms a number of experiences. The growth of experience makes necessary a system of symbols. And, finally, (4) the acceptance of certain definite motor modifications as the symbols of certain conscious states, common to all minds, is largely a social affair. To a certain extent, the establishing of a system of motor symbols has its account in "natural" connections between some kinds of conscious states and somehow corresponding kinds of movements. Thus there are gestures and sounds which all men instinctively or impulsively employ, in order to express conscious states common to all; for example, perhaps, beckoning, threatening with fist or foot, scowling, exclamations and the imitative sounds generally.

Plainly the very nature of human development is such that language must make its appeal chiefly to the eye and ear, as something seen or heard. A few cases in real life (such as Laura Bridgeman's), and the fictitious case of the novel "God's Fool," show how man, even when dedependent upon tactual and muscular symbolism exclusively, far surpasses any of the lower animals in his capacity for intellectual development. But human language is preëminently an affair of words; and "the word," primarily, is something spoken in order to be heard. It accords, then, with both the physiological and the psychological conditions of the development of man's intellect to find that in almost all our processes of thinking we catch ourselves "talking to ourselves."

We seem warranted in affirming that some recognized and accepted symbolic form of movement is the normal accompaniment of all thinking, and the indispensable condition of all development of thought. In man's case, the peculiarly human symbol is the word — the movement of the vocal organs as moulded by conscious processes, after patterns or types that have become accepted as signs of these conscious processes.

Origin of Language. — The psychological answer to the inquiry, Whence comes language? refers to the entire nature of man. Both physiology and psychology show the absurdity of speaking of a "faculty of language." Physiology indicates that the interpretation and use of spoken and written words involves, in a complicated and large way, almost the entire hemispheres of the brain. Nor is the psychological origin of language properly explained by speaking of it as the result and the expression of "abstract thinking" alone. All the principal forms of mental life on its sides of sensation, imagination, and intellection, are concerned in the origin and development of language. But it is in the realm of feeling, and of the practical effort to secure consciously selected ends, that some of its chief sources and stimuli are also found.

The answer to the question, Why the lower animals do not develop languages, is to be found in the considerations referred to above. In the more general meaning of the word, many species of them appear to have elaborate systems of "signs" — either felt, or seen, or heard, or perhaps smelled, or appealing to unknown forms of sensory effect — which express and arouse conscious processes common to all the members of the species. *Their* language corresponds most elaborately to *themselves;* as *man's* language corresponds to *himself.* The total cause of the differences in the forms which they use, as compared with human language, and in the meaning of those forms as expressed in conscious states, is no less than the entire difference between them and man, — both physiologically and psychologically considered.

The Word as a Name. — It is somewhat customary to say that the lower animals cannot devise and use names as man does, because they are incapable of "conception" properly so called. There is truth in this statement; although this truth is often incorrectly stated. To appreciate the facts let us recall what has been shown to be the nature of conceptual thinking as distinguished from the processes of ideation (see pp. 135 f. and 274 f.). Such thinking is not confined to a train of more or less vivid and concrete mental images bound together by the semi-mechanical laws of association. It is not *mere* ideation under the influence of those conditions which give to the particular ideas control over the succession of ideas. It is rather a series of judgments in which individuals are related as coming under common characteristic qualities and modes of behavior; and this is made possible, because we have agreed with ourselves and with one another to regard similar individuals as, for purposes of thought, the same, in respect of their qualities or of their relations.

To illustrate this subject still further let us consider what actually takes place in human consciousness through the attempt to "think out" the full meaning of a Name. In every such case, especially wherever what is called abstract thinking is demanded, the most vivid and lifelike ideas are not recognized as *fully* representing that for which the name stands. We *reserve* the right to change their detailed characteristics; and the more "content-full" they are the more do we recognize their *unfitness* to stand for all that the name means to us. The word "lion," for example, must do service not simply for me, to name that particular beast in the cage yonder, or pictured on this page of a book, or conjured up as a lively memory of some past experience of mine. It must serve equally well for you to name another "sufficiently like" beast, picture, or remembrance. And if we both try to imagine a lion, or if we talk about lions together, the same word must set limits to our imagination, and must make our talk intelligible to each other.

Further reflection on our experience in using names enforces these three truths: (1) *The name signifies a series of judgments synthesizing many similars as — thought-wise — the same for all users of the name.* This has already been made sufficiently clear. (2) *The name becomes the correlate of genuinely conceptual thinking only when sound acquires recognition as a conventional "movable type."* In the process of the evolution of language the words themselves lose much of the concrete, emotional and ideational significance which originally called them forth. Names themselves get cold and abstract, through use, as it were. In the older languages — as in Hebrew and the Shemitic languages generally — the concrete and sensuous character of the words is very striking. "Anger," for example, is "hard-breathing," "tumult of boiling," "noise of breaking," etc. The "substance" of anything is its "bone."

The "same primitive union of sensation and idea" is preserved by the language of savages. Thus the Tasmanians call the quality of hardness, "like-a-stone," and speak of any tall thing as "having long-legs." (3) *The name is the support and vehicle of the conception because it operates to set agoing and to guide the processes of thinking which originally terminated in giving the name.* It is a challenge to every man who hears it, to think, and to think after the pattern of those who have come to use this name as a "movable type."

Romanes declares that animals cannot use sounds as movable types, because they are only capable of forming "recepts" (or rather highly abstract representative images). They cannot, however, form general notions or conceptions, in the stricter meaning, of the latter word. "That the verbal signs used by talking birds," says this writer, "are due to association and to association only, all the evidence I have met with goes to prove." In accordance with all that has thus far been said it is, psychologically, more correct to say that animals cannot use words as men do, because they cannot, to the same extent or in the same way, *think* as men do. The sage little boy of whom M. Perez tells, who remarked of certain insects: "Generally, but not always, those insects light on the leaves, etc.," far surpassed in conceptual thinking the most intelligent of the animals.

Language as the "Vehicle" of Thought. — The gist of what it is necessary to say on this subject has already been said. The relation of language to judgment needs no separate treatment from the psychologist's point of view. In all lengthy trains of reasoning, however, the partial or almost complete substitution of language, as a succession of symbols, for thought, as the succession of conscious ratiocinative processes, is of the highest influence. The development of thinking in relation to the evolution of language thus depends upon two things: (1) the rapid and correct substitution of the symbol for the actual intellectual process; and (2) the ability to think out in detail the meaning of the substituted symbol so as to justify the act of substitution. Thus it comes about that the accumulated knowledge of man is so largely the ability to use words appropriately to the actual facts and to the experience of the most observing and intelligent minds. Growth in intellect is growth in judgment as to how to speak and to act *truly* — in case one wishes to speak or to act at all.

Of the æsthetical and other uses of spoken or written words, and the relations such uses sustain to the character and development of mental life, we can only make a bare suggestion at this point.

[On conception and judgment, see Ward: art. Psychology in Encyc. Brit.; Carpenter: Mental Physiology, I, chap. 6, and II, chap. 12 f.; James: The Principles of Psychology, II, chap. xxii; Taine: De l'intelligence; Lipps: Grundtatsachen d. Seelenlebens, chap. xx; and Volkmann: Lehrbuch d. Psychologie, II, p. 241 f. Among the multitude of works on Logic, that of Bosanquet is, on this subject, much the best: (see the entire First Volume); compare J. S. Mill: Logic, books ii and iii. On the relation of language to thought, see Whitney: Language and the Study of Language. On the development of speech and language in the child, see Preyer: The Mind of the Child, Part II; and Perez: First Three Years of Childhood, pp. 236–264.]

CHAPTER XIV

SPACE, TIME, AND CAUSATION

There are some of our conceptions which undoubtedly stand in peculiar relations to the development of mental life. Among all such conceptions the most important are these three, — Space, Time, and Causation. To use popular language, which seems to be clear but which itself is most difficult to expound clearly, we speak as though all things existed "in space," all events took place "in time," and all changes must be explained as "due to the action" of causes. These and other similar conceptions are sometimes called "categories." So far as the work of the psychologist goes he may properly consider them from two points of view: — (1) As respects the actual conscious processes in which these conceptions arise, and in connection with which they develop; and (2) as respects the relation these conceptions sustain to the entire framework, so to speak, of our mental development. On this latter point, however, psychology can properly do little more than merely to note the relation. It must then turn over the problems it raises to philosophy in its two allied branches of epistemology and metaphysics.

Nature of a so-called "Category." — It is very easy to misconceive the nature of those conceptions to which we have just given the name categories. This is, indeed, because these conceptions are so peculiar. But their "peculiarity" does not consist so much in the way in which they arise and develop *as conceptions;* it consists rather in the way their origin and development *stand related* to the entire mental life.

The peculiar psychological characteristics of the conceptions of space, time, and causation may be fairly well summed up under the following three considerations: (1) Regarded as thought-products these conceptions are capable of reaching a high degree of abstraction. To illustrate by the first one of the three: A series of judgments based upon a wide experience with extended objects of perception leads one to the bare thought of the "possibility of extension in general." On the other hand, if one tries to realize in the form of a concrete image what one understands by "space," one may select anything whatever, from flower to star, from lightest gas to densest solid, from minutest speck to the hugest bulk conceivable. All alike are perceived, and must be imagined and thought — however diverse their qualities — as "*in* space." (2) Connected with this peculiarity is the content-less character of the categories. No variety of marks — to use a logical term — needs to be grasped together in order to give import to their name. For example, no particular thing, and no quality of a thing, *must be* imagined or thought as dependently connected with our conception of space. (3) These conceptions are peculiarly the products of reflection upon the most general processes of our own mental life. They may be said to be formed by the mind in recognition of its own modes of behavior, both in knowing its Self and in knowing Things.

To sum up these characteristics we may define the categories, psychologically considered, as *certain highly abstract conceptions which the mind frames by reflection upon its own most general and fundamental modes of behavior. As conceptions*, however, they arise and develop in precisely the same way as do all other conceptions; that is, *they are the joint products of abstract ideation and of thinking faculty.* The process of conceiving space, time, and causation is essentially the same as that already described.

The older psychologies dealt largely with the so-called "categories," which by British and American authors were frequently called "intuitions." In this manner of doctrine they often became rather unwarrantably metaphysical. The so-called "new psychology" apparently does not consider the doctrine of the categories as requiring any thoughtful treatment whatever at its hands. In this manner of conduct it either ingenuously confesses its intention to confine itself to a portion of psychology, or else it rather unwarrantably neglects some of its own self-chosen business. For the human mind undoubtedly does, as a matter of fact, frame and cherish these conceptions as the most universal and necessary forms of all known existences. And no sincere and thorough student of psychology can consider anything pertaining to the business of the mind as foreign to himself.

The name "intuition" for such conceptions as space, time, and causation, is most inappropriate; and to class them together as belonging to a so-called faculty misleads us. To "intuit" is most properly to see presentatively, face to face, as it were; *envisagement* is the characteristic of intuitive mental activity. But even if we speak of ourselves as "having intuitions" of spaces, times, causes, instead of intuitively perceiving things as extended, successive, and acting upon each other, we cannot apply the same terms to our apprehension of the categories, Space, Time, and Causation. The conscious processes which correspond to these abstract conceptions are the furthest possible from an envisagement, or face-to-face acquaintance, such as we have with the objects of perception and of imagination.

A word of explanation will suffice to describe the peculiar nature of the categories as respects their relation to the entire mental life. This relation is such that they may be spoken of as the most general, content-less, and yet necessary forms of the mind's functioning; or, again, as the forms of all cognition — always actually, although, until brought out by reflection upon ourselves, unconsciously operative. Perhaps a sentence from the author's Philosophy of Knowledge will help us to grasp this thought: "By categories we mean simply those forms of the arising, the self-relating, and the development of our own ideas, which we believe to be shared by all men and hold to belong to the unchanging constitution of the mind."

The customary tests of a category, as given by the older psychologists, were (1) originality, (2) universality, (3) necessity. These characteristics correspond with our actual experience, only if we interpret the words correctly. The conceptions of space, time, and causation, may be called "original" because an analysis of the experience in which the conceptions arise shows nothing lying back of the experience itself which will serve to explain them, or from which we may derive them. This was really true of our doctrine of perception as giving us an "immediate awareness" of things external and extended; it was true of our doctrine of memory as presenting us with events that appear as ideas present now in consciousness, but belonging to past time. The categories are "universal" and "necessary," because *all men* do perceive, conceive, and think of things as spatially, temporally, and causally related; nay, they *must* so perceive, conceive, and think of them, because "it is their nature" (the nature of the men) so to do. They are forms of intellectual functioning.

Space as a so-called "Category." — The doctrine of space as a category, so far as the psychologist goes, is nothing more than the history of the development of the conception which answers to the word. For psychology "empty space," or "mere space," is only an abstraction, resulting from a developed activity of memory, imagination, and judgment, in dependence upon presentations of sense already acquired. In order, then, to develop this doctrine it is simply necessary to consider (1) how imagination and thought modify our perceptive experience of extended things; and then (2) how we, by reflecting upon this way of the mind's behavior, reach yet more abstract and higher forms of conception. First of all we briefly consider —

The Formation of the Conception of Empty Space. — Let us suppose that two highly elaborate systems of perceptions — those of sight and those of skin, muscles, and joints — have already been developed. They have become fused and associated in all our knowledge of things; but by the same activity of discrimination which brought this about, they can be in a measure separated. We can discriminate the thing as seen from the same thing as touched. Meantime, vaguer forms of space-perceptions by the senses of hearing and smell have become connected with our conception of the same thing. All this affords a basis for the general notion of extension as a quality of things, as distinguished from the sensuous intuition of this particular thing as extended to any of the particular senses. *Empty space*, for nose and ear, means all the space that lies between the object which emits the odor or the sound and our own bodies. Empty space for touch means all the space in which visual objects, that are not also solid so as to oppose our movements, lie extended. Empty space to sight means all that space which is limited by the opposition of things to our movement, through it, but which may be filled up with a perceived or imagined variety of visual extensions.

The process of discrimination which distinguishes areas that are filled to one or more senses, but empty to some other sense, needs only to be carried further in order to secure the conception of an "absolutely empty" space. If the room is quite empty to all touch-perceptions, and to all sight-perceptions so far as particular things in it are concerned, still I can measure its size (or extension) by moving my eyes, or by walking from side to side. By both forms of perception I encounter limits when I reach the opposite walls of the room; but between these walls neither sight nor touch perceives any thing. The room, then, "has no thing in it" — either visual thing or tangible thing; "it is *quite* empty," yet it has extension since I can measure it with both eye and moving body. It is filled with *mere* extension; it is occupied by *empty* space. This conception of "nothing but space as itself extended" cannot be imaged except in terms of either visual or tactual extension, "as of" a thing; but it can be thought as *the mere possibility of being filled with any kind of extended things.*

Conception of "Pure" Space-Relations. — It has already been shown that the principal conceptions of the spatial properties and spatial relations of things are based upon perceptive experiences with sight and touch. These relations and properties for things visual can only be conceived of in terms of sight; and the same thing is true of things as known by touch. But considered — that is judged or thought about — as *mere* properties and relations, the two forms of experience are largely identical. They are not, however, wholly so. And the most highly developed space-conceptions of the blind have not in them the possibilities of abstraction and freedom from the limits of sense which belong to visual space-conceptions. It is looking into the sky and "thinking about" the immensely distant stars which gives us our sensuous basis and up-lift to imagination and thought. For the blind man the conception of limitless space is realized in the form of a very different possible experience; he thinks of himself as swimming or walking, in a homogeneous element, — on and on, without opposition and yet without stopping.

The elaborate scientific conceptions of space, of the astronomer for example, are formed in essentially the same manner as those of the average man. The scientific intellect simply carries the processes of abstraction and judging much further. In the process of abstraction the ideas become more and more schematic; and, finally, an elaborate system of symbols is used in order to hold and convey whole groups of spatial properties and spatial relations, grasped together by a single sign. In such processes of abstract thinking symbols take the place of concrete images of sight, and even of words; and thus the mathematics of space is elaborated as though space were some kind of an entity, itself extended in three dimensions, for which the symbols stand as representative. But when the thinker gives meaning to his symbols he can only appeal to the same experience which makes up the "plain man's" consciousness of space.

These are not the final words about space. But when it has been shown that, as a conception, it is framed and developed by essentially the same mental activities as characterize all processes of conceptual thinking, and the peculiar relation has been noted in which it stands to the origin and growth of all our experience of things, all has been said that belongs to psychology to teach concerning the nature of Space.

Time as a so-called "Category." — On this subject nothing need be added to what has already been said, except to call attention to two truths: (1) The sensuous data on which the conception of time reposes differ from those on which reposes the conception of space. All *events* — hence all experiences — take place in time. But hearing, rather than touch or sight, is preëminently the "time-sense." (2) The range in the application of the conception of time is much greater than that of the conception of space. Phenomena of consciousness, whether of Self or of Thing, have time-properties and time-relations. It is necessary, then, to begin with indicating the nature of —

Elementary Time-Consciousness. — In order to understand the nature of that aspect of all conscious states in which the conception of time has its roots, it is necessary to observe the following truths of experience: (1) All the contents of consciousness, in order to be known as related in time, must be somewhat prolonged *processes* rather than instantaneous events. All conscious states actually take time to form themselves. For this reason we object to the favorite term, "the specious present," to indicate the unit of psychological time. It is just this present which *is* real

— the actual "time-grasp" of consciousness. It is the mathematical present which is specious and unreal. The real present is never a non-enduring "now." (2) The consciousness of time, whether of the endurance of a state or of a succession of states, is itself a process. The apprehension of time is itself a time-experience. (3) Conscious states, as considered by themselves, all have an aspect or quality, which we may call "endurance"; and when compared they stand in a relation which we may call "succession." (4) Attention, as stimulated by emotional accompaniments and effects is directed to this aspect, or quality; and in connection with this focusing of attention, all the activities of the intellect are called out in forming and developing the conception of time.

In a word: *Every intellect constructs its own time-consciousness; for the consciousness of time is itself a conscious process, but its peculiarity is, that it is an intellectual apprehension of all the contents of consciousness as processes, enduring and successive.*

In the very young infant all rhythmic events in consciousness stimulate and assist the development of the earlier apprehensions of time. To swing a bright ball before its eyes, to croon tunes in its ears, to rock it in a cradle, or to sway it in one's arms, is to awaken the elementary time-consciousness. "Again," "again," and "yet again," — sensations similar in quality but placed in succession in the stream of consciousness; — such are the materials which this form of intellectual reaction finds most stimulating. But under prolonged painful states, or when forced to wait for gratified desire, the impression of duration is stamped deep into experience. How long that unbearable pain seems! How sudden the change of state when a fall comes, or its nursing bottle is rudely jerked away!

As the conscious states are compared with each other "timewise," the consciousness of present, past, and future in time, becomes more clearly defined. No definite conception of these three forms of time belongs, of course, to the earlier time-consciousness of the child. It is the work of imagination and intellect which converts the vaguer consciousness of a "still-there," into the conception of "present time" of the "now-going" or "just-gone," into the conception of "past time"; of the "not-yet-there" but coming, into the conception of "future time."

Development of the Conception of Time. — In the ordinary life of the child the succession of sense-perceptions, memories, and mental images accompanied by feelings of expectation, flows on at a tolerably uniform rate. And attention — to borrow a figure of speech from Dr. Ward — moves "like the foot of a snail" rather than "by hops from one definite spot to another." "Thus our perception of a period of time is not comparable to so many terms in a series of finite units, any more than it is to a series of infinitesimals."

Experiences occur, however, which concentrate attention on this time-quality of the different experiences, and so bring the consciousness of time to a "sharper point," as it were. These are, for the most part, such experiences as, on account of their painful or pleasurable character, excite a strong interest in their own duration, or in the repetition of their memory-image in its original connections, or in their anticipatory mental representation. *Such experiences emphasize the present, past, and future of the numerically different conscious states.* They constitute a challenge to conceive of these states, and to classify them, in another way than by their similarities and differences of quality or of locality. Thus our conceptions of present, past, and future, as qualifications of events, antedate our conception of time. The latter conception is, indeed, the result of a further process of generalization upon the basis of the earlier conceptions. We understand the three kinds of time before we conceive of Time in general.

We cannot speak of the conception of "empty" time with the same meaning as that which applies to this adjective in connection with our conceptions of space. All time is equally filled with the different varieties of our sense-experience. We cannot *empty* any of them, in respect of their time-qualification; for they are all alike processes in time. For that very reason, however, no matter how much alike or unlike as respects their contents simply, *as respects time-consciousness all the conscious states are to the intellect the same.* They are "assimilable" under the one conception of time. Furthermore, some of them are much more constant in the stream of consciousness than are others; the time-rate of their change is relatively slower (comp. p. 29 f.). They, therefore, serve as a background on which the more fleeting experiences stand recorded. For example, one may steadily observe a horse running for several minutes, while repeatedly noting the brief convulsive movements of the second-hand of a watch. Or one may think continuously of home and friends, while the "fringes of consciousness" flutter momently with the changing scenery of landscape seen through the window of the railway car. Thus the thought of that qualification of duration in which all events share, and of that relation of succession in which all events stand to each other, is stimulated and developed.

The further work of the mind upon this time-experience is essentially the same as that which is involved in the elaboration of all our conceptions. This work results in picturing a series of events, regardless of their definite qualities, running on and running on — with the possibility of applying to the series some standard of measurement an indefinite number of times. In this way a vague conception of *mere* time is brought before the mind. Strictly speaking, however, "empty time" is a psychological fiction, is purely negative so far as its "emptiness" goes. Even more true is this of the conception of "infinite time." The attempt to frame this conception ends in a negative judgment: *no limit* to its duration, or to the succession of events that may occur in it, must be fixed.

The Conception of Number. — Counting is a highly intellectual and imaginative process, involving much more than a discriminating judgment as to the comparative quantity of certain objects of perception. It requires also the development of conceptions of space and of time. Each thing is discerned as separable in space from some other; and yet both things must be judged as coming under terms of some relation. The particular relation depends upon the point of view adopted, and the end chosen to keep in view. Thus the table is *one* table, with *three* parts (top, standard, and legs); or it is *twenty* different pieces of wood put together; or it is countless *millions* of molecules and atoms. When I count, I agree with myself that I will disregard the other unlikenesses of the things I am counting, and will consider the things counted as separate and yet unified by being judged under some idea of mine.

Conceptions of number all result from counting things and then judging them together under terms for each one of all the groups of individuals which we choose to constitute into that group — either for practical or for theoretical purposes. Here the repetition of some standard, some measuring idea, is always implied; whether it is so much space, or so many things, or so many events, upon which the intellectual activity of numbering falls. At the basis of the whole process lies the obscure yet fundamental work of discriminating consciousness. And the difference between the animal's discriminations of quantity and man's conceptions of number, is measured by the entire difference between the imaginations and intellects of the two kinds of sentient beings.

Causation as a so-called "Category." — Neither the ordinary nor the scientific conception of causation is a simple and unanalyzable affair. This conception cannot, therefore, be called a "category" in the same meaning of the word which applies to space and to time. If, for example, we pronounce any event (as the fall of a spark into a keg of gunpowder) to be "the cause" of another event (the explosion with its immediate accompaniments), we are recognizing the valid application to a particular instance of a *variety* of fundamental conceptions. Conceptions of Being, Action, Relation, Time, Reason, or Ground, are all plainly involved in such a judgment. Only a little less obviously do we find present in every such judgment vague ideas of Identity, Unity, and Force.

Moreover, if the origin and development of the conception of causation be traced, and the old-fashioned tests of "originality," "universality," and "necessity," be applied, it will be found that these tests have now a different and more doubtful meaning. It is difficult to formulate this so-called category in any such way that every man will be forced to recognize the formula as faithfully stating all the facts, without any possible or conceivable exception, of his experience. And as to the conceptions of causation, its so-called "law" and universality, not to say necessity of application, which are accepted by modern science, — they are yet more abstract, doubtful and remote from the ordinary consciousness.

Elementary Consciousness of Causation. — There is no reasonable question, however, as to the kind of experience in which man's ideas of cause and effect have their rise. The failure to recognize this experience was one of the most mischief-making of the mistakes of the older psychology. It is in connection with the more careful study of "motor consciousness," of the human being as always in action and thus experiencing associated changes in his own self-feeling and in perceived things, that the correct doctrine of this conception is established. But we have seen that all consciousness is in one of its most important aspects, *motor;* and that neither perception of things nor consciousness of self can be accounted for without assigning an important place to the active and conative elements of experience. It may easily be apparent, then, why the human mind feels warranted in framing the picture of a world of objects which are always "doing something to each other." *It is in the use of the muscles as dependent upon conation and in association with the feeling of effort and with various forms of pleasurable and painful feeling, that the conception of causation has its origin.*

Analysis shows that our primitive experience involves the following particulars: (1) The immediate awareness of ourselves as active, the fact of conative self-consciousness; (2) the immediate awareness of ourselves as suffering, as "undergoing" changes of affective consciousness, which we will not or which are not according to our will; (3) the closely accompanying perception of the changed relations of things, to us and to one another; (4) the association, in dependent connection, of these experienced and perceived changes, according to the forms of representative faculty; (5) the inchoate work of intellect in the reduction of this total experience to uniform modes of its occurrence, and the formation of the beginnings of a conception of "law" as applied to the changing relations of ourselves and of things.

Professor Preyer, in his book on "The Mind of the Child," II, p. 191 f., correctly finds the genesis of the conception of causation in "*the perception of a change produced by one's own activity*"; he speaks of "the most remarkable day, from a psycho-genetic point of view," in the life of the infant, as "the one in which he first experiences *the connection of a movement executed by himself with a sense-impression following upon it.*" In the case of his own child it was the tearing and crumpling of paper in which Preyer recognized the birth of this conception. He found the child from the tenth to the thirty-third month, doing and observing the effects of his doing, in all possible ways, with an amazing persistency. The infant pulls out and pushes in a drawer; he tears the covers of a book; he digs and scrapes together the sand; he puts shells, stones, or buttons in rows; he pours water in and out of bottles and cups, etc. In a word, he is acting and at the same time observing the changes in himself and in things which follow upon his actions.

Development of the Conception of Causation. — The anthropomorphic way in which the child regards things as acting after the pattern of himself is too well known to require detailed illustration. The transition between himself and other human beings is suggested by all his experience; the transition to the animals, with which he quarrels or plays, is scarcely more difficult. "I hit the boy, and he hit me back"; or, "I kicked the dog, and the dog bit me," are typical instances of such experiences. But this attribution of activity dependent upon relations, and followed by changes in relations, is not confined to living beings. And, indeed, how can it be? The related changes of all things are interpreted and explained by us after the analogy of our experience of ourselves with things. All popular language to express the conception of causation illustrates this. "The poker *makes* the fire burn"; and "The fire *makes* the poker red or *burns* it up." In general, *it is the projection of our experience with ourselves into the world of related things, under the impulse of the desire so to know things as to adjust ourselves to them, which results in framing the general notion of causation.*

Finally, widening interests in the world stimulate the imagination and intellect to certain other more abstract and comprehensive generalizations. New experiences constantly confirm, or break up and readjust, the old judgments as to what in **A** is the cause of changes in **B**. We never find ourselves possessed of a perfectly sure and invincible knowledge of what the related things are going to do, *in view*, as it were, of their changing relations to each other. But the one impression, or conviction, which remains is this: in all their doing they must "pay some regard" to each other. This conviction deepens and expands with the growth which the mastery of intellect attains over the different items of experience. It may be stated in this somewhat vague way: *All things are regarded as having the reasons for their behavior, in part, in their relations to other things. Only thus can that progressive unification of experience take place which is the law of the very life and growth of the intellect itself.*

[On Space and Time consult, besides the larger psychologies, Nichols: The Psychology of Time; Hodgson: Time and Space, chaps. ii–iv; Vierordt: Der Zeitsinn; and articles in Mind, vol. III, pp. 433 f.; and X, pp. 227, 377, and 512. On the psychology of Causation, see the author's Psychology, Descriptive and Explanatory, pp. 475 f., 500 f.; Philosophy of Mind, p. 218 f.; Philosophy of Knowledge, chaps. vii and x. Comp. Ward: Encyc. Brit., XX, p. 82 f.; Höffding: Psychology, V, 4.]

CHAPTER XV

KNOWLEDGE OF THINGS AND KNOWLEDGE OF SELF

It is facts of *knowledge* in which the science of psychology, as well as every form of science, has its origin; and to facts of knowledge it must appeal to establish its claims. The right to make this appeal in such manner as implies a correspondence between the descriptive history of mind and the life of a real being which bears that name, is a matter for philosophy to debate. In the same manner it devolves upon philosophy to examine the ultimate warrant on which rests the popular assumption that the forms of mental representation and of conceptual thinking correspond with the real nature and actual changes of things.

Psychology, as the science of conscious states,— of their nature, genesis, and development,— is not, however, without a certain obligation here. "The relation of knowing is," indeed, "the most mysterious thing in the world;" and knowing, both as psychical fact and as valid representation of reality, must be assumed by the psychologist. On the other hand, it is part of his task to give at least the descriptive history of the genesis and development of the various kinds of cognitive consciousness. This has already been accomplished in large measure by our study of the elements and the growth of perception, memory, and thought. It remains to add some further notice of how the two sorts of developed cognition — that of Things and that of Self — come about.

The Nature of Knowledge. — We cannot, of course, define knowledge, or even accurately describe what is meant by the word, except by using terms of knowledge. We can tell what is "known about" processes of knowledge only by assuming that those to whom the account comes will be able to verify it by facing themselves, as they themselves experience the same processes. Two most important considerations should be mentioned at once, however; for they are almost uniformly overlooked, not only in the popular analysis, but also in the analysis of many psychologists. First: *From the psychological point of view knowledge is a development.* Our mental life does not begin with genuine cognitive states of consciousness. It grows not only *in* knowledge, but also *into* knowledge — into more and more of what alone is entitled to be called genuine cognition. We may, therefore, speak of stages and degrees in the growth of knowledge.

Second: *The particular complex form of development which is called "knowledge" involves, in a living unity, all the activities of the mind.* Emphatically it must be affirmed: It is *not intellect* alone that knows, it is *we* who know. *Mere* thinking, if such an experience were at all possible, might go on to all eternity and no cognition of any sort result. Were not man a being of just such affective and conative, as well as intellective, faculties as actually belong to him, he would not be the knower that he is. But this point is so important as to demand further consideration.

Knowing as involving Feeling and Will.—That the growth of knowledge involves the development of all forms of so-called intellective faculty — of attention, discrimination, memory, imagination, judgment, and thought — is universally acknowledged. But the important part which feeling plays in the development of cognition has been relatively neglected by psychology. The affective modifications of consciousness, however, influence our cognitions in the following three important ways: (1) As feelings of intellectual curiosity, of anticipatory pleasure in discovery, etc., they serve the general purpose of stimulating the more purely intellective functions of mind. (2) As feelings of relation, in various different forms, they accompany, conduct, and inhibit or reinforce all the intellectual activities,—the work of imagination, memory, sense-perception, judgment, and reasoning (comp. p. 95 f.). But (3) emotional factors and attitudes of the mind enter into and determine the very character of the cognitive processes, as it were. *Intellect and feeling blend in all cognition; and the complex result—the very object of knowledge—is determined by both.*

Our experience with illusions and hallucinations illustrates the statement just made. The feeling of fatigue makes the lifted weight to be perceived heavy; the feeling of disappointed expectation may make it appear light. The feeling of expectation may even create an object of perception to correspond to itself. Emotions of disgust or of shrinking make the object to be known as ugly or fearful. It is not the unscientific man alone who puts his *pre*sentiment or prejudice (his *pre*-judgment in the form of feeling) into what he perceives, remembers, thinks, and so knows; it is the scientific expert as well. Witness the physicist who, on lifting the metal for the first time, felt the actually light-weight potassium to be very heavy; or the other man of science who, through the vacuum, distinctly heard the ticking of the clock, because his theory of sound required that its ticking should, under these circumstances, be audible. The more carefully guarded is our "psychical research," the more apparent becomes the influence of all manner of subtle emotional elements upon what men most certainly *know* to be true. At a recent meeting of a scientific society, those present heard its President affirm that he had found it impossible to get from his colleagues in science a statement of facts known to them uncolored by their feelings toward the current theories of evolution.

After all that has already been discovered as to the manner in which willing enters into all the cognitive processes,—such as the focusing and distribution of attention, the train of associated ideas, the sequence and selective traits of recognitive memories, the features emphasized and made clear in conceptual thinking, the acceptance or rejection of disturbing emotions, etc.,— it is scarcely necessary to discuss the matter over again. "How can a man learn to know himself?" asks Goethe; and his answer is: "By reflection never, only by action." The same thing is true of the knowledge of things. *It is only by willing, and thus experiencing the reactionary effects of willing, that we attain any knowledge either of Self or of Things.*

It is difficult to over-emphasize the importance of this view of the psychology of knowledge. The cognitive processes are never colorless and passive; they are warm with feeling and realized only as the result of voluntary activity. I cannot know myself as I am, without knowing myself as an emotional and voluntary knower. And it is only in and through our active experience with things in moulding them and in being subjected to their various forms of influencing us, that we attain a knowledge of nature. And, indeed, nature, as known to us, is a system of beings which are constantly in a condition of *interaction* with us and with one another.

The same truth can be argued from the point of view which considers the origin and nature of the conception of causation, as investigated in the last chapter. For things are not *known* unless they are experienced as causes. But, as we have already seen, such an experience can be gained only in a feeling-full and voluntary intercourse with things.

The Kinds of Knowledge. — In tracing the development of mental life we have already been made to recognize one important distinction in the kinds of knowledge. This distinction depends upon the relation in which the mental process of knowing stands to the object known. Hence the division into immediate cognition and mediate cognition, or "knowledge *of*" and "knowledge *about*." But it has also been made clear that this distinction is one of degrees; although when the difference in degrees passes beyond a certain not easily assignable limit, it becomes a difference in kind. Thus, in any very elaborate act of sense-perception, "knowledge of" the particular thing perceived and "knowledge about" other similar things would certainly be blended together. The same is true of all memory-knowledge of things absent or of distant events. Yet one would not hesitate to say that one's knowledge of one's native town is a different kind of knowledge from that which one has of Singapore, for example, — in case one has read about the latter place, but has never visited it. All this, however, has been sufficiently explained in treating of perception, memory, and conceptual thinking.

There is a distinction in knowledges, as respects objects, which is of a quite different order from the foregoing. This is the distinction between knowledge *of* Things and knowledge *of* Self — a distinction which applies in a modified way to knowledge *about* Things and knowledge *about* Self. Such a "bi-partition" of all cognitions, as respects their objects, is itself a matter of development. The infant does not bring it with him into the world. For him, as yet, there is no Self and there are no things. Only as a living being, growing in acquaintance with himself, and in ever active and observant commerce with things, does he make, improve, and more emphatically validate this fundamental distinction. For the distinction, when once made, is fundamental and quite unique; and it lies at the basis of all distinctions. Impair this distinction, and all distinctions are impaired. Destroy it, and all cognitions of every kind sink into an undiscernible chaos of impressions, which are not to be spoken of either as functions of a Knower or as forms of knowledge. As the distinction between Self and things fades away, all manner of distinctions fade away; knowledge itself is lost.

We need, then, further to examine —

The Grounds on which this Distinction is based. — The distinction between the knowing Self and the things known cannot be made clearer than it is in itself; nor can the distinction be justified by giving grounds for it which lie outside of itself. This is true at least so far as its psychology is concerned. The psychologist can, however, note what factors or aspects of the conscious states are grasped together as belonging to the knowing Subject, the Self; and he can also note what other factors or aspects of the conscious states are grasped together as belonging to the objects known, the things that are regarded as external and extended in space. For this is what the process of "bi-partition" results in; — on the one side, a knower, and on the other side, the various things which he knows.

Let us now recur to the point of view from which the psychologist must regard all the phenomena of his science (comp. pp. 1 f. and 20 f.). They were all said to be phenomena of consciousness, — conscious states or processes, psychoses, forms of mental life, — *as such*. Therefore the psychological point of view was said to be *subjective par excellence*. But the study of the development of perception, and of the establishment of an actual "bi-partition" of all the objects of cognition, compels us to regard some of these conscious states as preëminently *objective*. They are given to us, to investigate, whenever we begin to approach their psychology, as the already accomplished cognitions of things.

Observation and reflection upon the dividing of all objects of knowledge into these two main classes lead us to recognize the following grounds on which the work of dividing is done: (1) It is chiefly the visual and tactual sense-impressions, with the memories, imaginings, and thoughts referring to them, which determine the complexion of our knowledge of things. But (2) the other sense-impressions — as of hearing, taste, and smell — become associated with those of the "first rank" of objectivity, so that we know of and about things through these impressions also. (3) All these sense-impressions have different relations to the changes of feeling and of the conative consciousness from those sustained by that other kind of experiences which is organized into the knowledge of and about the Self. (4) These latter — the "stuff" out of which the cognition of Self is made — are not chiefly our sense-experiences at all, but our mental images, thoughts, feelings, and volitions. *They*, as activities which *we* perform, are the preferred aspects of experience that offer themselves to be grasped together in the apprehension of Self, and to be subjected to reflection for the development of the conception of Self. (5) In all the growth of both kinds of knowledge we are studying processes which must, so far as the psychologist discerns, be considered as an active making of the distinction by the conscious Subject itself. The very knowledge which involves the distinction is the work of the Knower. Its formula is: "I know myself and I know the things, and that they are *not* myself." *For psychology at least*, whatever metaphysics may hold, *both Things and Self are given to consciousness as constructs of the active intellect upon a basis of differences in actual experience.*

It is difficult for the adult to believe how vague and shifty is, originally, this "bi-partition" of experience into that with Self and that with Things. This is due not only to the obscure and feeble character of the first discriminations made, but also to the fact that feelings of strong, painful, or pleasurable tone shift themselves back and forth in their localization, and constantly change in respect of their relations of dependence upon the will. For example, the infant plunged into the bath that is too hot feels first the sensations of physical shock accompanied by changes in visual and tactual perceptions which are calculated to result in knowledge of some external thing. Moreover, it cannot will away these sense-impressions of its own without changing its perceived relations to this external thing. But the arising and persistence of the painful feeling of being burned calls off attention to a phase of consciousness which is more truly *its own.* And this is calculated to stimulate a certain form of self-knowledge that has great practical importance. . . . Even in much of our adult life the distinction between Self and things is not consciously and sharply drawn. The same complex of sensations and feelings may at the present instant be either perceived as a hard-seated and sharp-backed chair; or as a localized discomfort in the Self of the person occupying the chair.

In general we may say: (1) *The element of feeling tends to preponderate as familiarity and habit blur the outlines of the intellectual apprehension of the object of knowledge.* And (2) *as the element of feeling increases, the distinction between the two classes of objects, things and self, is submerged, as it were.* Thus in many forms of adult but relatively unthinking life, a return to the vague and shifty consciousness of the child takes place. The skilful player feels his violin as a part of himself, for the time being; the singer or speaker does not regard his throat as apart from himself, until it seems "sore," "stiff," or otherwise an "objectified reluctant."

It is not necessary to develop further the psychological doctrine of the knowledge of things. What has been said in the chapter on perception, when brought into connection with what belongs to this chapter on the nature of cognition, will be quite sufficient. The whole subject requires, however, some more detailed consideration of the development of the knowledge of the Self.

Development of Self-Consciousness. — One of the earliest things noted (see p. 22 f.) about the elementary processes of the mind was this: Every conscious state, in order that it may come into existence in the stream of consciousness, involves a certain discriminating activity. Each state must somehow be separated off from the immediately contiguous portions of the stream and grasped together, in order to become *one* recognizable conscious state or mental process.

The reasons — so far as they lie in the contents of consciousness — why some conscious states get regarded as *my* states, and others get regarded as the *qualities* of things, have already been briefly recorded. They have been seen to consist chiefly in the affective and conative factors which enter, in such different amounts and ways, into all the conscious processes. But so far as these reasons lie in the native ways of the behavior of active consciousness, in the so-called "laws" which define the original nature of mind, psychology can only accept them as ultimate and unanalyzable facts.

From this point on, however, the development of self-consciousness is not a bit more mysterious than is the development of objective consciousness, — or perception as the "immediate awareness" of things. It is the same active intellect which is engaged in the acquisition of both kinds of knowledge. I know myself better, as I grow in my knowledge of things. I know things more fully, as I discern more accurately and completely the manifold relations in which my Self stands to things. *The consciousness of Self and the perception of external objects develop in a mutual dependence, and by exercise of the same intellective functions upon two discernibly different sorts of experience.* We are no more warranted, then, in speaking of a special "faculty of self-consciousness," than we are in speaking of a special faculty of perceiving stones, trees, stars, and other things. All the faculties are engaged in, and pledged to, this process of bi-partition, which ends in the most fundamental of all distinctions, namely, the distinction between my Self and Things as other than myself.

There are two opposite forms of the "psychologist's fallacy" which are current upon this subject. One of these virtually denies that self-consciousness is a development, and considers it rather as an original faculty given ready-made, as it were, to the human mind.

Because the psychologist cannot put himself into the place of the infant, without carrying over his own self-conscious development, he attributes the same kind of a developed self-consciousness to the psychoses of the infant. But it might as correctly be held that because the adult cannot see a certain object through the microscope without becoming "immediately aware" of it as an amœba or a diatom, therefore if the infant's eye were applied to the microscope, he too would have the same perceptive experience.

The opposite fallacy consists in minimizing and reducing to a *mere* difference in degrees the entire adult distinction between Self and other things. But in doing this the psychologist forgets that he is cutting from under himself as a scientific observer, as well as from under all science, the ground which comprises all possible points of standing. The validity of this same distinction he virtually assumes in all his investigations; and to it they all compel him to return. Everything he has to say about "subjective" and "objective," about "normal" and "abnormal," about "psychoses as dependent upon environment," and "conscious states as due to external stimuli" or as "dependent upon cerebral conditions," implies this same distinction. Whatever kind of metaphysics he may bring himself to espouse, as a scientific psychologist he stands firm only upon the basis of this assumed bi-partition of Self and things.

Stages of Self-Consciousness. — Although self-consciousness, like all other forms of mental development, falls under the principle of continuity and proceeds, as a rule, with a tolerably smooth and uniform flow, it is possible to mark off epochs or stages in its career. These stages are distinguished by the predominating character of the conception of the Self. In the actual life of mind, however, they continually mingle. And by no means all individuals attain to any degree of clearness or fixity in the higher forms of conception. That is to say: — The most metaphysical philosopher customarily conceives of himself in terms essentially the same as those to which the child is confined. But he can, and he often does, think out a conception of "*the Self*," for himself and for others, such as the child is incapable of framing; such, too, as the average adult has only in a confused and inchoate form.

Various numbers of Selves, or stages in the development of the conception of Self, have been distinguished by different psychologists. For our purposes it will be sufficient to notice the following three: (1) The sentient bodily Self; (2) the thinking, willing, and cognizing Self — the Knower and Doer; and (3) the metaphysical Self, or the unitary and really existent being which is conceived as continuing all the way between its own remembered conscious states. Each of these three conceptions demands a brief consideration; and, first, —

The Sentient, Bodily Self. — It has already been suggested (comp. p. 314 f.) that the mixture of obscure bodily feelings — the sensations that are ill localized, confused, and that have a strong tone of pleasure-pain mixed with them — plays an important part in our work of dividing ourselves off from external things. The peculiarity of such feelings is this: in the work of "bi-partition" they may be assigned in either one of the two main directions. They may be considered as belonging to my Self — a sentient body — as acted upon by external things; or they may be considered as belonging to my feeling and conative Self as caused by the condition of my body. Either of these points of view may be taken by the adult; and he can readily pass, without confusion, from one to the other. But with the infant the former point of view is the one seized and most habitually held; it is the primitive, the natural, the more apprehensible, and the more fixed and constant. And what is true of the infant, is true in a modified way of the infantile man, — of the savage, of the hypnotic and the dreamer, of the unreflecting adult. *It is the bodily Self, as all alive with feeling and movement, and as constantly used in the cognition of things, while at the same time sensitive to the changes effected in it by changing relations to things, which is known as marking the first stage in the development of the conception of Self.*

It has been well said that if the earliest form of the mental representation corresponding to the words, "I" "Ego," "Self," etc., could speak, it would say: "*What is here-and-now, that am I.*" But for the child, "What-*is*-here-and-now"—"that-which-I-*am*"—is what it can see, touch, and feel internally, of its own body. Ask it the question, "*Where* are *you?*" and it will point to the more sentient or accessible parts of its own body. Ask it the further question, "*What* are *you?*" or, "What do you mean when you say *I?*" and it can only repeat the significant gesture.

This most primitive form of the conception of Self early undergoes modifications that are connected with the general intellectual development. Such modifications may be traced in two directions: (1) the conception becomes more highly differentiated; and (2) the conception becomes subject to various accretions. The different portions and organs of the body, as they get separated off from each other, are more or less closely identified with their corresponding conscious states. Thus a child of five years, on being pressed to tell what she meant by the "I" that "loves papa," finally solved the puzzle to her satisfaction by saying: "Oh, now I know; it is my arms, because I hug him with them; and my lips, because I kiss him with them." Thus, too, we all speak of our selves as having a pain "*in* the head," or as seeing "*with* the eyes," and feeling "*with* the hand," etc.

At the same time, the childish and savage, as well as the popular adult conception of the Self is modified and enlarged by a variety of accretions. Among these perhaps the most important is the *name*. This led Goethe to say that "the name is not worn as a dress but grows on to us layer upon layer, like our skin." And Volkmann has remarked that certain savage tribes change the name of a sick child; and that calling an animal by the same name seems to encourage an obscure development of self-consciousness. The clothes we wear are also an almost inseparable part of our feeling and perception of this sentient bodily Self. Lotze has remarked how our feeling and estimate of ourselves expands and contracts, and undergoes a variety of modifications, with the changes we make in our clothing.

What is sometimes called the "social Self" really falls, in large measure, under the same stage in the development of the conception. Strictly speaking, there can be no such existence, and no conception answering to such an existence, as a *social* Self. The social self is *my* self as standing in a variety of relations to other selves. This term, like all similar terms ("social consciousness," etc.), is figurative; and unless understood as figurative, is a misnomer. It is this sentient bodily being, rather than the more purely spiritual or more strictly metaphysical Self, which "goes into" society, and which is conceived of in a social way. It is, therefore, the conception of it which is so profoundly modified, and almost broken up, by abrupt and extensive changes in the social and other allied forms of environment.

Abnormal and even insane developments of the conception of Self often begin in the form of marked changes of experience with the sentient and active bodily organism. The limb that loses feeling and voluntary motion seems "dead to us"; it is no longer a part of our here-and-now existence. We wake up with the consciousness of changes in certain feeling-full sensations which we call "feeling queer," or not "feeling a bit like" ourselves. But we ordinarily retain a good firm ground of standing in the recognized likeness of our physical and social surroundings, and in the memory of past thoughts, feelings, and deeds, which we recognitively attribute to our (same) selves. If these stand-points fail us, or become relatively very weak while the changes in the features of the bodily Self are relatively comprehensive, persistent, and strong, "the mind"—as is significantly said—"gives way." The total conception of Self becomes confused, disturbed, and more or less permanently modified.

Examples of such aberration in the work of so-called self-consciousness are frequent enough among hypnotic subjects; the insane asylums hold not a few afflicted in this way. Shakespeare illustrates the truth by the confusion which changes in the physical environment wrought upon the self-conception of his Christopher Sly. And Delbœuf tells the story of a poor cobbler of Liège, who having been captured by the monks while he lay in a drunken fit, shaved, made to suffer tonsure, clothed in monk's garb, and surrounded by "the brethren" and treated as one of their number, could only say: "Go to the foot of the bridge, and see if Gilles the cobbler is in his shop; if he is not, I am he; but if he is, may the devil get me if I know who I am."

It should be noticed, however, that in almost all such cases, although the conception of "who-and-what-I-am" is profoundly changed, all conception of Self is by no means lost. "Here am I," is still the formula with which the active, feeling, and willing mind announces its self-known existence. And if you ask it, "What are you?" the answer still is: "*What is here and now, that am I.*" All this requires us to recognize *an immense difference between a certain metamorphosis in the conception of Self, and a complete perversion or suppression of so-called natural self-consciousness.* The latter amounts to no less than the complete destruction of all recognizable being for the Self.

The Thinking, Willing, and Knowing Self. — Whatever may be the true scientific doctrine of the dependence upon the body of all conscious states, we are by no means always made aware in consciousness of this dependence. I may, indeed, be compelled to admit that when I think of myself, certain obscure bodily feelings about the region of the forehead or of the throat may be brought above the threshold of consciousness; or that I cannot will to perform any particular deed without creating a discernible feeling of tension or of strain in the muscles innervated by the act of will. But I can regard myself *merely as thinking or willing;* I can know myself *solely in the aspect of a knower.* This feat is accomplished by the same developed activity of memory, imagination, and thought, which makes it possible to regard the particular activities or common qualities of external things "by themselves," as it were.

Whenever I reflectively attend to any conscious state of my own, I am compelled to an act of recognitive memory. The very focusing of attention upon the state, or process, causes it to be regarded as one portion of a stream of consciousness that is somehow comparable with, and capable of being assimilated to, other portions of the stream. If, however, it is regarded as a self-felt and self-willed process,— and it must be so regarded when I reflect upon it as a truly *mental* process, — the data are secured for the formation of a more spiritual conception of the Self. In the case of the child, this conception is, so to speak, "split off" from its experience with the total bodily Self. For example, if the child reflects upon the complex memory-picture of its own experience in moving a heavy chair, or in getting a heavy fall, part of this experience, even so far as it excludes the perception of the object moved or struck against, is more external and objective; part, however, is more internal and subjective. It sees and feels its own limbs as in contact with an object external to the body; but it feels what it cannot see, or touch, by directing attention to any external part of its own body. *It is this unlocalized but self-felt activity which constitutes the germ of the conception of the spiritual Self.*

In the very act of voluntarily remembering, and in all the processes of voluntary attention and of striving to think out any problem set before the mind, this interior, unlocalized, but self-felt activity becomes relatively more prominent. A part of many such processes would, indeed, lead us to conclude that *we* remember, attend, and think, *with* the head,— in somewhat the same way as we see with the eyes and touch with the hand. As to the alleged scientific conclusion that such processes are performed in, or with, the brain, the stream of consciousness, as such, gives us not the slightest data. We do not, upon reflecting over our conscious states, so much as get the hint that there is any brain. But, on the contrary, with all the more objective factors of such processes, however faint and unobtrusive and even impossible to detect they may be, this same "self-felt activity" is the constant as well as the prominent thing discovered by reflection.

It is, then, through the analytic and generalizing work of the mind upon its own growing experience that the conception of a spiritual Self is framed. This conception needs no other form of a mental process, no added faculty, in order to account for its own development. It should be noted, however, that the formation of this conception, like the formation of all conceptions, results from a series of judgments; and judgment is an accomplished synthesis, an achieved act of relating. This leads us to emphasize the following truths: (1) *It is as a self-active, thinking, and feeling being that I know myself as most clearly differenced from all external things,—including the visible and tangible parts of my own body;* and (2) *developed self-consciousness involves the judgment that, especially in certain of its processes, subject and object are related as a being is related to one of its many states.*

We may raise the question, why it is that the lower animals appear to have no conception of Self comparable to that of the lowest orders of men; and why we do not incline to consider them as actually being selves, after the pattern of human selfhood. The answer to this question must refer to the whole range of the differences between the mental life of man and that of the other animals. It is, then, an altogether unjustifiable exaggeration in Lotze to claim that a crushed worm, writhing in pain, can both make and attach value to the distinction between itself and the rest of the world, as the most intelligent angel, did it lack feeling, could not. For there is not necessarily the slightest germ of self-consciousness in mere "writhing in pain." And although human self-knowledge implies feeling, we cannot argue that no-intelligence could make this fundamental distinction unless it were under the stimulus of pleasure-pains. Besides, "making the distinction" and "attaching value to it" are two quite different things; it involves much more than a capacity for pleasure-pains, to be able to attach a peculiar *value* to the Self.

The Metaphysical Conception of Self. — That men come to believe in their minds, or spiritual selves, as real beings, which have a unity of their own, and some sort of a permanent existence in time, is no more mysterious than that they come to believe in the reality of things. It is, indeed, even less mysterious. Regarded from the purely psychological point of view, and therefore considered simply as a conscious process, the fact is this: *In one and the same act the mind makes itself the object of its self-knowledge and believes in the real being of that which it thus makes its own object.*

If, however, we ask for the details of this conception of the Self as a real being, we find the greatest variety in different individual cases. This variety is, indeed, great enough to answer to the separate experience of every individual mind that has framed any such conception. And why should not the variety be thus great? For the conception is in every case framed, though with a common conviction, yet upon the basis of a special experience. Such variation is dependent, besides the variations in the individual experiences, chiefly upon two things: (1) the degree of development which has been attained in so-called abstract or conceptual thinking. To conceive of my Self as a unitary and real being, possibly separable from all connection with a bodily organism, is confessedly a highly abstract and theoretical affair. The precise framing of this conception is, then, also dependent upon: (2) a variety of allied judgments and opinions of a mixed personal, social, ethical, and theological character.

All this, for its further analysis, testing, and theoretical unfolding, psychology must turn over to the philosophy of mind.

There is, however, one point which is of the utmost importance for the descriptive history and the psychological theory of all those mental processes that are called "knowledge." It shall be briefly touched upon as summarized in the term —

Belief in Reality. — That there is some sort of a "*trans-subjective* reference" in every finished process of knowledge, no man of so-called "common-sense" would think of denying. And even few psychologists have the hardihood to deny that a thorough analysis of knowledge inevitably comes upon this fact. These few can only put their denial into the form of an asseveration which is itself a confession of the fact, and so self-contradictory and absurd. The character of this trans-subjective reference, which is essential to the very character of every process of knowing, has been variously described. The points emphasized by all the descriptions correspond to certain factors in our common experience of knowledge. They cannot be altogether appropriately collected under any one term. But perhaps the phrase "Belief in Reality" is the best single term.

As Sully has said: "Psychology requires a single term to denote all varieties of assurance from mere conjecture up to reasoned certainty, and the word 'belief,' in English psychology at least, has come to be used in this sense." In this meaning of the word, all cognition involves and, in the last analysis, rests upon, belief. It is this element of certainty which, in some sort, submits itself to reasoning in order to become intelligent and self-conscious, and thus brings knowledge and reality into correlation with each other. Many writers — Hume, Bagehot, and James, for example — consider this belief as being more of the nature of a feeling.

In the study of the development of knowledge — both that of things and that of the Self — we are led to notice the following truths: (1) All intense and enduring experiences tend to call out and to strengthen that *conviction of the reality of the object* which characterizes all knowledge. As an object of opinion, or of mere image-making or thinking faculty, my psychosis has not as yet an existence affirmed for it "outside of" the mental process. But if my experience with the object is intense and enduring, the conviction that the existence of the object is independent of this experience, tends to frame itself in consciousness. (2) This conviction is justified and made rational, when it attaches itself to a judgment that reposes on recognized grounds. I believe that particular thing to be real, that particular event to be actual, because its existence has been made the subject of a judging process which can recall a reason why. In cases of so-called "immediate knowledge," this "reason why" is because I have seen, felt, heard, etc., in an attentive and voluntary way. In cases of mediate or indirect knowledge, I find my "reason why" in some other person's testimony, or in some belief or principle which I have adopted, or in some law of nature or of mind which I know to be true. (3) This belief in reality appears in the development of mental life, at first, without any recognition of its own existence or of the end it serves. It is not the special possession of any individual; it cannot be explained as the result of any peculiar course in development. It belongs, by its nature, to every body. *Of course, we all believe in things as existing outside of our own minds. Such a belief is an inseparable part of our knowledge of both ourselves and of things.* (4) Inasmuch as knowledge has been seen to involve all our faculties of intellection, feeling, and will, it is not strange that the belief which enters into the constitution of knowledge should itself be regarded in connection with all these faculties. Thus it is sometimes spoken of as a sort of "intuiting," or positing, or affirming of reality, and sometimes as a "feeling-sure," or "emotion of conviction," having respect to reality. We can scarcely too often call attention to the important truth that this belief is born in the experience we have when our wills are inhibited by things which "will not" as we will.

But here again we must hand the further discussion of this topic over to philosophy with the remark that *a scientific psychology seems to find a sort of metaphysical faith as an inseparable element in the existence and development of all human knowledge.* The origin and development of this faith have been described, so far as psychology can, in giving the analysis and descriptive history of both kinds of the one knowing process.

[For a further and more philosophical discussion of this subject, see especially the author's Philosophy of Knowledge and Philosophy of Mind. Comp. also James: The Principles of Psychology, II, xxi; Sully: Illusions; and The Human Mind, I, p. 483 f.; Taine: De L'intelligence, I, ii, chap. 1; Paulhan: L'Activité mentale, p. 297 f.; Lazarus: Das Leben d. Seele, ii, p. 41 f.]

CHAPTER XVI

EMOTIONS AND SENTIMENTS

The development of the life of feeling proceeds upon the basis of a great variety of relations to our intellectual development. The bewildering complexity at which it thus arrives, therefore, results largely from the modifications which this intellectual development introduces into the simpler and more fundamental forms of feeling. The characteristics imparted the physiological conditions of the emotional aspect of the stream of consciousness cannot, however, be left out of account. With all these intellectual and bodily effects fully in view, we may announce the general principle controlling the formation of our complex feelings, as follows: *Substantially the same conscious state, so far as distinctions of affective quality are concerned, may be regarded either simply as a feeling, or as an emotion, or a passion, or a sentiment.*

Variables which Condition the Development of Feeling. — There are four principal classes of conditions on which the character of the more complex feelings depends. Of these (1) the varying *intensity* of the primitive forms of feeling which enter into combination is very important. This changing quantitative factor, perhaps, concerns primarily the pleasure-pain tone of the various feelings; but it is not confined to this characteristic. For example, one may properly speak of one's self as being "more or less" surprised, expectant, curious, etc., as well as more or less "painfully" or "agreeably" surprised, expectant, curious, etc. (2) In close dependence upon the variable of intensity is another variable which may be spoken of as the "*bodily* *resonance.*" The physiological conditions of all feeling have already been seen (p. 91 f.) to provide for such a factor. The overflow or "surplusage" of that cerebral excitement which goes with all intense feeling is accompanied by important changes, not only in the centres of the brain, but in the various systems of the bodily organs — vasomotor, respiratory, muscular, digestive — to the remotest parts of the body. And the feeling of these changes blends with, and greatly modifies, the original feeling. In somewhat similar manner (3) the movements of feeling are accompanied by changes in the trains of the associated ideas and of the sequent thoughts; these changes are themselves, in turn, felt so as profoundly to modify the original affective conscious states. *Ideation and thinking*, as "appreciated" (see p. 95 f.) in the formation of the complex feelings, provide, then, a third class of variables. And, finally, (4) the *proportions* in which the simpler feelings enter into the more complex feelings are variable; the result of this variation of proportion is a "conflict," and a "blending," or a new "mixture," or a "prevalence" of certain factors over the others.

The following questions, then, may be asked concerning any very complex and developed form of feeling: In what proportions, and with what intensities, do the simpler feelings enter into the compound? And what are the factors of the compound emotion or sentiment, which are due either to the resulting bodily disturbance, or to the "upsetting" of the mind? Thus, for example, a special experience of feeling might be described as being very angry and slightly afraid, but not conscious at all of losing control over one's ideas, and suffering only a slight conscious change in the condition of the physical organism.

If such a "state" of mind as the foregoing be carefully analyzed, it will be found that two of the more fundamental natural emotions (anger and fear) enter into it, in varying proportions (as indicated by the words "very" and "slightly"). But on account of an acquired habit of self-control, or for some other reason, the effects provided for under the second and third class of variables are not prominent in consciousness. No careful observer, however, would fail to find them existing to some extent, and so modifying the complex state of mind.

More Primitive Kinds of Feeling. — There are forms of feeling in which all men share; and which we have, therefore, to reckon with in all our social intercourse with our fellows. Some of these belong to man in common with the lower animals. They have an important biological significance; they are safe-guards, encitements, and guides to the development of the individual and of the species. At the same time, there is among men the greatest range of individuality in the "variables" just referred to; and all these primitive forms of feeling are capable of education and of refinement so as to make them a most important and splendid part in the texture of the well-developed man.

For example, in two persons of different dispositions and culture, natural anger may develop into quite different forms of feeling; it may become in one a blinding animal emotion, and in the other, a fine sentiment of personal worthiness and of the value of justice. Woman's jealousy is different from man's; and one woman differs from another woman in respect of her jealousy. In his formation of the more complex kinds of feeling, the emotions and sentiments, man shows his far-reaching superiority to the lower animals. What remains relatively simple, direct, and frankly physical, in their case, shows in his case a capacity for becoming the source of all that is most beautiful in art, most admirable in conduct, and most holy in religion. It is in his superior equipment of emotions and sentiments, quite as much as in his larger power of thought, that his higher ability for artistic, moral, and religious — and even for scientific and philosophical — development consists.

Among the principal kinds of "native" feeling, on the basis of which the complex emotions and sentiments are formed, the following eight may be mentioned: Anger, Fear, Grief, Joy, Astonishment, Curiosity, Jealousy, Sympathy. These are all "human," not because they are not shared in by the lower animals, but rather because they belong to all men in such manner that their development is characteristic of the individual man, — in fact, largely determinative of the individual's character. They are all observable in the infant, at a very early stage of its development. The proportions, particular intensities, and the amounts of bodily and psychical disturbance, with which they manifest themselves, constitute largely what we are accustomed to call the "disposition" of every child. The way they get themselves woven into the habitual psychoses determines what we later call the man's character. They depend, with different degrees of closeness, upon the development of the life of ideation and thought. Thus, curiosity, jealousy, and sympathy require more "advanced ideas" than do anger, fear, joy, and grief.

It is neither necessary nor possible, in so brief a treatment of psychology, to enter upon the detailed description of these primitive kinds of human affective consciousness. In the vigorous infant, intense and painful sensations, especially when they are accompanied by impeding his free movements, naturally excite anger. Holding tightly the limb he wishes to move arouses in him the same characteristic reaction with which the young serpent or crocodile responds to the stick that is set in its way. Only the vaguest kind of perceptions are necessary to this emotion. So, too, do children show "natural fear" — that is, fear of objects of which they have had no previous experience to account for such fear. Sigismund tells of a little girl who showed fear of cats as early as the fourteenth week of life.

Curiosity, even as a semi-intellectual affair, belongs to very young children generally. Its roots seem to be in a sort of psychical restlessness, an impulsive reaching out for the pleasure of psychical activity. Definite intellectual curiosity is a later and more complex affair. But it is difficult to account for the development of the later form without recognizing this more primitive feeling of curiosity. What is sometimes called "natural" or "animal" sympathy can scarcely be treated as any one distinct form of feeling. Its earliest appearance is connected with the principle of imitation (comp. p. 121), and takes the form of conforming one's own affective consciousness to that apparent in the social environment. Thus the babe that cries when it sees or hears its mother crying, really *feels* grief (of the sympathetic sort); and the school-boy who gets mad simply "because the rest do," is no less genuinely mad. It is in such "sympathetic" outbursts or enticements of feeling that the foundations of social order are largely laid. All through life —

> "Fellowship in woe doth woe assuage,
> As palmers' chat makes short their pilgrimage."

Distinction of Emotions and Sentiments. — There is no fixed distinction between the two kinds into which the heading of this chapter divides the more complex forms of feeling. As has already been said (p. 328), the principle of affective development affirms that by modifying the variables the same feeling may reach its own emotional or sentimental stage: or it may be transformed into a quite new conflict or mixture of feelings. Thus the affection which characterizes the sexual relation may be an overwhelming emotion or passion at one time, an almost toneless feeling at another time, and, again, a vague and weak or a clear and strong sentiment. And between the more abrupt transitions an almost indefinite variety of stages may be experienced.

It may be said in a general way, however, that emotions are distinguished from sentiments by the following two characteristics: (1) Emotions include a greater intensity of feeling and consequent amount of "bodily resonance" and of the consciousness of disturbance of the ideas and thoughts; but (2) sentiments depend upon an increased activity of the developed life of imagination and thought, with a relative absence of the consciousness of "bodily resonance" and disturbance of the ideas. But, as has already been indicated, any form of feeling may pass from sentiment to emotion, or the reverse. Thus, the sentimental queen of Prussia is said to have anticipated death with the emotion of joy; because she expected now to learn what Leibnitz had been unable to tell her. And a certain French chemist felt such an emotion of pleasure in one of his discoveries as to dance about his laboratory in the effort to give it vent.

Specific Characteristics of an Emotion. — When any form of feeling rises suddenly, or by a series of "summations," to a high pitch of intensity, the internal and external organs of the body feel the influence of an unusual excitement. Rather it would be more correct to say that these organs *are* thrown into an unusual state of excitement; and that *we feel* them thus excited. At the same time, as a normal result of the increased but less firmly associated excitement of the centres of the brain, the train of ideas and thoughts is disturbed; and we feel this disturbance. The stream of consciousness "runs troubled" with these ingredients due to excessive and not well coördinated external and cerebral excitement. Its current is emotional. We, considered as respects our experience of feeling, are in an emotional state. These three factors, then, enter into the creation of every emotion: (1) conscious psychical intensity, (2) felt "bodily resonance," (3) felt dissociation of the ideas and thoughts.

Of the first of these three factors it is necessary only to say that, in so far as the increased psychic energy which belongs to an emotional state of consciousness is not under the control of will, we appear to ourselves to be "suffering from the emotion" rather than actively engaged in bringing about the emotion. Our emotions *master us;* but when *we have* mastered them, they cease thereby to be so much "emotions."

"Bodily Resonance" of all Emotions. — This chief characteristic of all markedly emotional experiences demands further explanation. We can by no means accept a somewhat widely current theory, which regards the emotion as *nothing but* "the feeling of" the modifications (tension, pressure, strain) which have already taken place in the organs external to the brain. Thus we should have to say: I am very mad, because I sense the clenching of the fists, the setting together of jaws, the "goose-pimples" on the skin, the suppressed breathing, quickened circulation, etc.; and this "feeling of" the condition of these bodily organs is all there is of the emotion. This view is, however, even physiologically considered a very inadequate and indefensible hypothesis. It neglects the fundamental fact that the primary correlate of all our life of feeling seems to be just this "surplusage" of unorganized cerebral excitement; and that the stream of consciousness is from the first determined by the centrally originated changes in the brain-centres (the life and automatic activity of the brain-mass) as truly as it is also determined by modifications of these centres which originate in the organs of sense. The so-called "physiological" theory of the emotions is, then, poor physiology: For, *the bodily basis of the emotions, as of all our feelings, is no mere reflection in the brain of the state of the external organs; it is also laid in the brain considered as the exciter and controller of these external organs.*

What takes place in the development of any particular emotional state is not difficult to trace in terms of general nerve-physiology. The emotion, physiologically described, begins as a sort of nerve-storm, which is originally confined to some comparatively limited area of the brain. Increasing in intensity, however, it spreads over all the connected areas of the brain and passes down the various outgoing nerve-tracts to the different groups of striated muscles, and to the vascular, secretive, and respiratory organs. This sudden and intense discharge of nervous energy into these organs throws them into a condition of unwonted excitement. This excitement starts the sensory nerve-commotions from these organs to pour in upon the already much disturbed areas of the brain, and to modify and increase their disturbance. The total resulting disturbance may be spoken of as the "bodily resonance" or "organic reverberation" of the emotion. The "feeling of" it is what gives its more distinctly emotional character to the original feeling.

Psychologically considered, the emotions are then explained by noticing the explanation of the changes in consciousness which our feelings undergo as they rise to the emotional stage. The common thing about them all is the "appreciation" in consciousness — although it is a confused and unanalyzed thing, as becomes the very nature of an emotion — of this "bodily resonance." For *an essential part of the content of every emotion is that complex feeling which depends upon intense and widely diffused cerebral agitation, whether centrally initiated or due to the secondary changes in the organs external to the brain.*

The specific characteristics of the different emotions, so far as these depend upon the "bodily resonance" peculiar to each of them, vary considerably in details; and yet they have many features in common. That no considerable increase in the amount of cerebral excitement can take place without profoundly modifying the action of all the other organs of the body is a psycho-physical principle of the first rank. Among the organs whose action is most quickly and profoundly modified in this way are the following: (1) the rhythm and intensity of the heart-beat and the action of the whole vaso-motor apparatus; (2) the respiratory mechanism including epiglottis and muscles of the diaphragm; (3) the muscles of the face and eyes which are so expressive of the various emotions; and (4) the muscles which support and control the limbs. Hence (1) the rapid and irregular or suspended beating of the heart, the flushing and chilling of capillary circulation, and the changes in the texture of the skin; hence (2) the quickened breathing or tendency to "catch the breath," the feeling of suffocation, and the various modifications of respiration, such as sobbing, gasping, etc.; as well as (3) the glowering of eyes, or the setting of the teeth, the smiling or "haw-hawing," the open eye of joy, the drooping lid of grief; and, finally, (4) the defensive or offensive gestures and postures, or the flabby and trembling arms and legs. The effect of emotional excitement on the voice, and on the vague movements or secretory functions of the viscera, is also noteworthy.

It is unnecessary to enter into the details of the different emotional states; or to show how the varying characters of the "bodily resonance" produce the characteristic differences in the emotions themselves. Biology throws some light on these phenomena; when, for example, it calls attention to the defensive attitude into which the organs are thrown by the emotion of anger, or the tendency to escape by flight which fear induces. We may study the same phenomena in the pantomime of actors; or, better still, in the behavior of the hypnotic and the insane.

An interesting modification of experience takes place in the case of emotions which are very intense but are controlled or concealed. A sort of hidden and consuming fire seems to be burning in the veins, muscles, heart, and bowels of the one who is "nursing" anger, fear, grief, hatred, or joy. In the long run the slow-burning conflagration may eat up as much of tissue and destroy as much of psychical energy in the modern man as did the more violent outbreaks of these same emotions in his savage ancestors.

Emotional Disturbance of the Ideas. — From the points of view of physiology and psychology alike a "disordered brain" unfits one for thinking. But, physiologically considered, an intense uncontrolled emotion is a disordered brain. In this condition of cerebral excitement the regular interconnected activity of the centres of the brain through the association-tracts is temporarily impaired or broken up. On the side of consciousness, this disorder may be considered as a relative or almost complete "dissociation of the ideas." Such a state of dissociation has to do (1) with the time-rate of the ideas, (2) with the character and order of their connection, and (3) with their relation to the subject's conative and discriminating consciousness.

In strongly emotional states of consciousness, there may be either an unregulated and increased rapidity in the succession of the ideas (a "hurly-burly" of our thoughts); or an almost complete suspension of the train of association. Thus extreme anger, grief, hatred, or fear, tend to lose all their ideational differences; consciousness tends to become a blur of blind feeling. All thoughts seem to fuse under the white heat of passion, somewhat as all the hues of the spectrum, under the most intense light, become whitish. It is also notable that the strangest and most unaccountable suggestions spring up in consciousness, when strong emotions are having their sway. Especially is the rational and "objective" connection of the ideas and judgments interrupted. That control of the thoughts and accurate discriminations of objects are difficult, or impossible, in states of emotional excitement, is a commonplace observation.

But considered as a form of feeling, the peculiarity of an emotion is that it is itself colored by those changes in the ideation- and thought- processes which it has itself produced. *The very feeling which produces the disturbance of ideation and thought is destined in turn to feel this disturbance.* The "feeling of" the changes already occurring in the associated ideas — the "feeling of" the *dissociation* — becomes an important factor in the character peculiar to all emotions.

This subject should not be passed by without noticing the very great differences which different persons exhibit in the way they "bear," or "carry," the emotions common to them all. Some forms of feeling may be said, within not easily assignable limits, to favor by their increased intensity the more effective exercise of the intellectual functions. Emotions of pride, love of approbation, etc., often act in this way. It has been reported of more than one great orator that, when angered by opposition or even insult, he had the best use of his powers. Other emotions, such as shame, fear, anxiety, ennui, regularly depress the intellectual powers. Yet so great is the "rallying" energy of some men that they successfully react upon almost any form of intense excitement, and bring it under control for the better accomplishment of their chosen purposes. Such men may be choking with grief, and, *therefore*, speak or write so as the better to picture the reasons for this emotion in themselves and in others. It is the controlled display of emotion which excites corresponding emotion in others.

In general, there seems to be no established principle to connect the characteristic strength of an individual's feelings with the beneficial or injurious effect upon his intellectual activities. For some, the emotions are a paralysis. For others, what Balzac makes Louis Lambert say is true: "Anger, like all our passionate expressions, is a current of human force acting electrically." And, "passions are either defects or virtues in the highest power."

Conflict of Emotions. — The feelings, when they reach an emotional stage, may come into "conflict" and either continue conflicting, or "prevail" over one another; or they may blend in some new and more complex form of feeling. In this regard, our experience with our emotions somewhat resembles that with our color sensations. Thus A may find himself now in an attitude rather of fear, and again rather of love, toward B; at still another time, he may scarcely know whether his feeling is more of love or more of fear. The result of such transient conflicts may come in time to be a predominating emotion either of fear, or of love; or else it may best be described as a sort of reverential affection or affectionate reverence.

Interesting and varied but not very tangible relations seem to exist among the different main kinds of human emotion. Thus the passage from one to another is made more probable and more easy, or more improbable and more difficult. From pity, grief, or a sort of fear, to love, for the same object is a frequent and comparatively smooth transition. And love itself may be broken up into a number of classes by "admixture" with either of these and with many other forms of feeling. The tendency of men to rebound from one emotion, especially when it is excessive, to its opposite, is also psychologically noteworthy.

Where the passage from one marked condition of emotional excitement to its opposite is sudden and abrupt, the later of the two emotions is enhanced by the contrast. This effect is doubtless partly a result of conscious memory, but it is also partly a result of the very contrast, physiologically and psychologically considered.

> "For if of joy, being altogether wanting,
> It doth remember me the more of sorrow;
> Or if of grief, being altogether had,
> It adds more sorrow to my want of joy."

Here, also, we may notice what Plato, in the Phædo, calls "an unaccustomed mixture of delight and sorrow"; and also the state of mind "which the most melancholy of all writers called the joy of grief."

Nature of the Sentiments. — It has already (p. 332) been said that those forms of complex feeling which are called "sentiments" are more distinctively "spiritual" than are the emotions. Indeed, of all our conscious states, considered feeling-wise, these are most thought of as belonging purely to the abstract and highly generalized conception of the Self. On the contrary, they have least of the marks of that "bodily resonance" which is so characteristic of emotional stages of feeling. Moreover, the objects which call forth our sentimental consciousness are many of them of a highly idealized character. Sentiments attach themselves to our ideals, — of things, of persons, of relations, etc., — to what we imagine and think *ought to be* rather than to what we know *actually is*.

It would be a mistake, however, to think that all influence from bodily conditions is wanting to the sentiments of men; or that the "feeling of" these conditions has nothing to do with the characteristic content of the different kinds of sentiment. For, it has also already been shown that the difference between the sentiments and the emotions is largely relative; and that, if we increase greatly the intensity of any of our complex feelings, no matter how refined intellectually and how much idealized the objects calling them forth may be, they tend to become emotional in character.

The specific characters of the different sentiments, as they depend partly upon the feeling of bodily conditions, will become clearer as we consider separately —

The Different Kinds of Sentiment. — The character of the mental operations and objects in connection with which our sentimental consciousness is modified, serves very well to classify the sentiments. In this way we may recognize three classes: (1) the Intellectual, (2) the Æsthetical, and (3) the Ethical. Other classes, as for example the "religious sentiments," might, perhaps, be added. But the so-called religious sentiments appear to be exceedingly complex and shifty forms of feeling, which combine elements from all three of the foregoing forms. And it was implied in treating of those forms of primitive feeling which have so largely an emotional development, that some of them are fitted to become mental attitudes toward the object of religious faith. Thus, we hear of a "fear of God," a "jealousy for Jehovah," a "joy in the Divine presence," etc. All this leads us back to the original point of view for the treatment of the whole subject; we are reminded again that "substantially the same conscious state, so far as distinctions of affective quality are concerned, may be regarded either simply as a feeling, or as an emotion, or a passion, or a sentiment." Each of the three kinds of sentiments just distinguished, however, requires a brief separate treatment.

Intellectual Sentiments. — Of complex feeling, which usually has an unobtrusive "bodily resonance" and which is called out in connection with intellectual ideals, two kinds may be recognized: (1) There are certain sentiments which serve to give impulse and excitement to the intellectual processes; and (2) There are other sentiments which are rather the accompaniments and guides of the intellectual processes.

Among the first of these two classes is prominent that complex attitude of affection toward knowledge and truth which is sometimes called "desire" (of knowledge), or "love" (of truth), or "sentiment" (of the value of science or of truth). That lower form of animal restlessness, which develops in gratified curiosity, and grows more distinctively "intellectual" with all the growth of mind, has already been noticed. In its further and highest development this complex attitude takes several different directions. The imagination may construct a picture which seems to comprise all that is worth while in all the particular truths gained by our actual experience, and by all possible experience. This fiction of the imagination is then called, "*the* truth." Now, of course, there really is no one all-inclusive truth; and we have no reason in the least to suspect that any one logical judgment, or system of judgments, begins to comprise all manner of separate truths. But the mind falls in love with this intellectual ideal, so lofty and so fine is its own construction. If it falls violently in love with this its ideal, the mind may be said to have a "passion for truth."

In a few cases, this passion becomes so absorbing as really to work havoc with mental development by suppression or extinction of equally noble and fine forms of sentiment. Thus Empedocles became "a living man no more: Nothing but a devouring flame of thought, but a naked, eternally restless mind." Fortunately, however, this feeling often remains a milder sentiment appreciative of the value of different truths, in accordance with their relation to the welfare of the souls of men.

In considering the second class of intellectual sentiments it is necessary to recur to a principle stated some time ago (see p. 95 f.): *All the processes of perception, memory, imagination, and thinking, have their peculiar accompaniments of feeling.* In not a few cases these sentiments do important service in guiding aright the intellectual processes themselves. In others this service is not obvious; but the feeling aspect of the conscious state seems quite as essential a part of the total state as does the process of ideation or of thought.

There is no doubt that logical thinking and correct conclusion are almost as much a matter of fitting sentiment as of conscious appreciation of clearly recognized grounds. The feeling of hesitation or uneasiness with which one makes a doubtful statement, when interested in having it true, is of significance here. It seems, in the first place, to exhibit the part which the consciousness of the bodily action and condition plays in even our most purely intellectual sentiments. To "lay down" the coveted proposition with tongue, or fist, or pen, and to feel the fact of laying it down, enforces one's mental confidence in the truth of the proposition. But if one cannot lay down, with a fair amount of confidence, that particular proposition, the "feeling of" the bodily hesitancy, of the lack of firm muscles, itself throws doubt over the proposition. It is well known that liars ordinarily find it convenient to bolster themselves up by repeated asseveration, with fist and foot, as well as organs of speech.

When any new and unexpected judgment is proposed for the mind's acceptance, it inevitably meets with a certain favorable or unfavorable attitude of feeling toward it, on the mind's part. No intellect ever works, as Mr. Huxley thought all intellects should work, — namely, as a "cold, logical engine." The way the proposition *feels its own* fitness with the established principles, beliefs, tendencies, and ruling sentiments of the mental life determines, in most instances, its acceptance or rejection. Is that white-sheeted form I see in my room on waking at night, a real ghost or an illusion due to the way the moonlight falls on the curtain? The truth of perception for me will depend upon whether I *believe* in ghosts, or not.

It should not be thought, however, that this influence of feeling has to do only with perceptions of, and judgments about, ghosts and similar things. In the words of one of the most distinguished scholars of the day: "If you wish to get the exact truth of fact from an expert, you must never ask but one expert." *For it is probably the feelings, far more and far oftener than strict logical conclusiveness, which settles for the time being what the truth must be held to be.* And, indeed, it is questionable whether men have any more ultimate test of truth than the sentiment or emotion of "conviction" which is itself rendered *firm* when any proposition makes them feel its fitness with the total character of their existing experience.

This so-called "feeling of fitness" is, indeed, itself exceedingly complex. It often includes the struggle or blending of surprise, expectation, feeling of similarity or of difference. The emotions and sentiments corresponding to the words anger, hatred, love, fear, admiration, and other terms of more distinctly æsthetical and ethical character, also take part in our total attitude of mind toward the truth. The mental reaction of the "scientist," whom Father Dalgairns describes as hearing with strong disfavor the absurdly unscientific expressions of the hymns sung on board ship while he was trying to discover "the truth" about some new kind of bug in his berth, was no less emotional than was that of the most pious of the "hymnologists."

Nature of Æsthetical Sentiments. — The varied and picturesque activity of the imagination in the construction of certain kinds of ideals calls out for its objects a peculiar class of sentiments. These ideals themselves are both sensuous and objective. The objects which call forth æsthetical feeling are properly concrete and lifelike, so as to appeal to the constructive activity of imagination through some form of sense-presentation. But the ideal, when, on the basis of this concrete and sensuous experience, it has been constructed, can no longer be regarded as *merely* subjective, as the *bare* product of the image-making faculty. It is regarded as having an objective being, and so as fit to receive a certain kind of feeling. The sublime or beautiful scene in nature, or the grand and beautiful thing in art, *is* the construct of the imagination of the beholder or of the maker. But it is not his own imagination which the lover of nature or the artist admires; it is the object, — *the construction of mental activity regarded as objective.*

We understand, then, the nature of æsthetical sentiments by bearing in mind the following four particulars: (1) The thing which excites æsthetical sentiment is always some construction of a more or less refined and developed activity of the imagination. This is as true of the perception of the beautiful in nature as it is of the creation of the beautiful in art. The unimaginative mind cannot *see* the beauties of nature. It has been truly said: "We view nature's scenes and movements as products, and admire the creative and expressive spirit behind." But such "viewing" is impossible for an eye that is not "armed" with imagination.

But (2) the contemplative attitude of intellect before the object is the characteristic of this form of sentimental feeling. Thus we note that the æsthetical emotions of the artist toward his own work arise only when he can pause to regard it objectively, or can somehow separate himself from it. This attitude Schopenhauer has emphasized as "pure contemplation, sinking one's self in perception, losing one's self in the object, forgetting all individuality, etc."

Furthermore, (3) although the æsthetical sentiments are agreeable (or disagreeable) feelings, — that is, they have a more or less strong tone of pleasure-pain — they are not simply "feelings of" the agreeable (or the disagreeable). If that traveller in the Pyrenees, of whom M. Guyau tells, really had *æsthetical* sentiment when drinking cool, fresh milk there, he was right in speaking of himself as having "experienced a series of feelings which the word *agreeable* is insufficient to designate."

And, finally, (4) in describing the nature of the æsthetical sentiments we must never forget their dependence upon man's tendency to form ideals. This tendency may itself be very obscure and difficult to trace. May we not speak of it as a noble dissatisfaction on man's part with every thing actual? And is it not chiefly for lack of this tendency, and its accompanying evolution of the imagination, that the lower animals seem devoid of genuine æsthetical sentiments?

We know that certain students of biology have ascribed, in the interests of their theory of evolution, a very highly refined sentiment of beauty to some of the animals. But this is one of several cases where the interests of theory cause the investigator to overreach himself. To prove that birds and beetles take part in the process of "natural selection" by choosing their mates in accord with a genuine *æsthetical* sentiment, proves altogether too much. For it proves that birds and beetles have an exquisite refinement of that highest form of feeling which elevates them æsthetically far above the power of the average naturalist to appreciate or to sympathize with them. Apparently in the lower animals it is only some form of merely sensuous and agreeable feeling, which, so far as the influence of consciousness reaches, operates in the selective process. But in man's case, on the contrary, some genuinely æsthetical sentiment, or *admiring appreciation of the object's value apart from its immediate relation to the individual*, mingles with all that is most sensuously agreeable.

On the other hand, the laws of the economical and pleasurable activity of the senses in contemplating the object must be regarded in awakening all genuine æsthetical feeling. In not a few cases, however, higher considerations triumph over the lower and more purely sensuous. From ethical and spiritual, as well as from certain more immediately æsthetical, points of view, that which is sensuously disagreeable may come to be regarded with the highest kind of sentimental approbation. Laocoön seems beautiful when we contemplate the moral heroism and parental devotion which his otherwise horrible situation picturesquely represents.

Kinds of Æsthetical Sentiment. — It belongs to a more special study of psychology, or to philosophy, to classify and discuss in detail the various subordinate modifications of complex æsthetical feeling. The characteristics in respect of which they vary have already been indicated. These three, however, require to be more especially noticed: (1) the factors contributed by the varying functions of the bodily organs; (2) the factors dependent upon the way in which the attention wanders or is focused and redistributed; and (3) the range and characteristic quality of the activity of imagination and thought in the construction of the object which calls out the feeling.

All these three variables may be illustrated by contrasting the sentiments which attach themselves to what we call "sublime" with those which belong to the contemplation of the "exquisite" or the "pretty." In the one case there is a *felt* expansiveness of all the more obtrusive bodily functions; the breathing is deeper, the eyes tend to move upwards and the head to be thrown back; the very bodily self seems to be expanding — but in vain, to take in the magnitude of the object. The attention is not fixed but wanders — away into the regions of space, or over vast stretches of time; or else it passes from one deed of great power to another, in the effort to experience the full effects of such a "summation" of representative energy. Meanwhile, imagination and thought are striving to outdo themselves in the framing of a picture of something worthy of the name sublime. In the appreciation of the exquisitely delicate or pretty, on the other hand, we feel the bodily and mental act of concentrated but not fatiguing attention, while the discriminating consciousness is giving to imagination a variety of agreeable details that are to enter into the products of its constructive activity. In this connection we may also remark upon the felt tendency to rhythmic and easily flowing movement which enters into our æsthetical consciousness of what we call "graceful."

A mere mention of the fact that there is a psychology of the ludicrous must suffice here. The physiological origin of laughter is found in the tendency to overflow, which belongs to all intense cerebral excitement. Thus the savage laughs when he thrusts his enemy through with a spear; and the child passes from crying to laughter, or blends both, under the influence of the same emotional excitement. The development of the feeling of the ludicrous takes place in early life, very largely under the influence of the principle of imitation. Even adults can scarcely refrain from laughing *with* others, although they do not know, or do not regard as ludicrous, that at which others are laughing. Laughter also occurs as an expression of the "feeling of playfulness." The sympathetic listener can scarcely avoid laughing at some of Beethoven's *scherzos*, which express so forcibly the "play feeling" (notably that — called by the master himself a *presto* — in the Seventh Symphony). With refinement of imagination the character of the sentiment for the ludicrous, and so the significance of laughter, changes greatly. It thus becomes more difficult to tell precisely what it is at which all men most intelligently do laugh.

But, perhaps, no one characteristic fits so many cases as that which the intellect classes as "the incongruous."

Nature of Ethical Sentiments. — Most of those forms of feeling which writers on morals consider it necessary to discuss are not distinctively ethical. Or rather the truth is, as we have already seen, that any of the original forms of feeling may in the course of development take on ethical characteristics in a secondary way. For example, natural anger becomes an ethical affair when it is regarded as a more or less voluntary attitude of the Self toward some object, perceived or conceived of; and then we may speak of it as either "morally right" or "morally wrong." This is as true of natural sympathy as of natural anger. And, indeed, the whole distinction between egoistic and altruistic emotions, as it is currently made, is inexact psychologically and misleading from the point of view of ethics. Anger may be as altruistic as sympathy. Indeed, sympathetic anger is one of the most valuable and essential forms of a cultivated altruism; and would that we had more of it! while far too much of so-called sympathy is a mischievous and immoral form of egoistic feeling.

There is such a thing, however, as genuinely ethical sentiment. Of all such sentiment the following particulars are true: (1) Certain original and unique forms of feeling belong to the contemplation of conduct and to the appreciation of character. These may fitly be spoken of as the *distinctively* ethical sentiments. *These sentiments are as incapable of derivation from other forms of feeling as are any of the higher and more complex processes of consciousness.* So far as we know anything about the consciousness of the lower animals it does not appear to assume these unique forms of affective development. (2) Ethical sentiments, however, attach themselves to judgments; and they develop in connection with the formation of a system of judgments — having respect to certain qualities of conduct and of character. (3) So far as ethical judgments themselves are concerned, there is nothing peculiar in those activities of perception, imagination, and thought which result in their formation. So far as the predicate of such judgments is concerned, they are distinctive. They all affirm "rightness" or "wrongness" of the particular conduct, or character, which is made the subject of the judgment.

Nature of Conscience. — The origin of the conception of "rightness" (and its opposite) may be a matter of dispute. *But there is no special faculty of "conscience" as a question of the manner of pronouncing judgments merely.* Any amount of reasoning is admissible in making up the mind as to what we will judge right, and what wrong. And into this "making-up-the-mind" the entire intellectual development of the individual and of the race may enter; indeed, it is quite sure to enter.

By the word "conscience," therefore, psychology understands a compound of feeling and intellection, relating to the quality of conduct and of character. Any individual's conscience is his system of feeling-full judgments, approving some deeds of will and disapproving others. Its precise character is the resultant of constitutional and acquired forms of reaction upon his social environment. The peculiar feeling of "oughtness" (and its opposite) emerges relatively late in the development of the life of feeling; yet, probably in most cases, not so late as even the earliest forms of genuinely æsthetical sentiment. It is, on the whole, more stable than are the allied forms of feeling for the beautiful. But the particular judgments to which the ethical feeling becomes attached are matters of education and development. And like every form of human emotion and sentiment the ethical sentiments are capable of refinement or coarsening, heightening or deadening, under the laws of exercise, habit, association, etc.

Kinds of Ethical Sentiments. — The distinctively moral forms of feeling appear to be no more than the following three: (1) the feeling of "oughtness" or of moral obligation (and its opposite); (2) the feeling of moral approbation (and its opposite), or appreciation of the value of conduct; and (3) the feeling of merit (and its opposite). The last two of these three forms of ethical sentiment, however, appear to be less clearly unanalyzable and underived than the first.

It would take us too far into the special psychology and even the metaphysics of ethics to trace the origin and development of these forms of feeling, and to justify the statement that they are the only, and yet the distinctively human, ethical sentiments. We must content ourselves with insisting again upon the distinction between certain forms of emotion and sentiment which become connected with moral judgments in a secondary way, and those unique modifications of consciousness, feeling-wise, which make distinctively *moral* judgments possible at all. Our general position, however, may be briefly illustrated by considering, —

The Ethical Sentiment of Obligation. — The environment of the infant is full of encouragements to certain kinds of conduct, and of checks and inhibitions put upon other kinds of conduct. The encouragements are, in general, the agreeable results which follow doing certain things; the inhibitions are often prompt and severe in the form of disagreeable results of conduct. As the distinction between persons and things is forced upon the child, another sort of distinction, scarcely less important, is also emphasized. This is the distinction between *events that happen* and merely give *pleasure* or *pain*, and *the doings of persons* that are received by other persons either with *approbation* and reward or with *disapprobation* and punishment.

If this distinction were merely set into the child's environment, and did not awaken any unique response in feeling on his part, it could never become the basis for a truly ethical development. But the case is not so. Just as a peculiar form of agreeable feeling, which is something more than mere feeling of the agreeable, dawns in the consciousness of the child when it sees others admiring objects which they call "beautiful"; so does an equally unique, agreeable feeling, which is something more than a feeling for the agreeable, dawn within his consciousness when he finds others approving of his conduct as "good." At first the blow because he has bitten his mother, and the smarting burn because he has touched the glowing coal, have the same significance. But perception and thought distinguish differences between these two kinds of inhibition. An inner difference springs up, in the form of feeling with which they are received.

The forms of behavior in himself and others, to which the germinal feelings of "ought" and "ought not" attach themselves, depend at first almost wholly upon the environment of the child. He judges "right" that which those about him judge right, and "wrong" what those about him judge wrong. At first, then, the uniquely moral content of the predicates of such judgments, — of the ideas of right and wrong, — is defined, for the infant, in terms of the obscure feelings which are called forth in him. In other words, it is a matter of education and of development, *what* he shall judge right, and *what* wrong. But morals did not begin with his judgments; the history of the formation of moral judgments is as old as the history of the human race.

With the general development of the faculty of judgment — of the power to think for one's self on the basis of an enlarged experience of consequences and an expansion or fluctuation of ideals — the attachments of the ethical sentiment of obligation became changed. Hence, oftentimes that peculiar conflict of sentiments which arises when the individual feels "I ought not," according to the early education of judgment, and yet knows "I ought," because he now apprehends a reason for a valid change of judgment. But from this point onward, it is not necessary to follow the development of ethical sentiment.

The view just sketched seems to us to harmonize, so far as psychology can, the opposite contentions of the intuitional and the evolutionary schools in ethics. In refusing to admit that ethical sentiments can be explained as a form of the feeling of the agreeable — that moral feeling belongs to the pleasure-pain group — the intuitionists are in the right, so far as psychology can say. Nor can we find anything in biology or so-called anthropology to displace them from this position. But that the particular judgments which called out these sentiments and which claim for themselves the appropriate use of the ideas corresponding to the words right and wrong, are matters for historical and evolutionary study, there is just as little doubt.

It seems also to us that the origin of the ideas of right and wrong for the individual, so far as it does not lie in the reception of current conceptions without any experience to answer to them, must be found in the *ethical sentiments* of the individual.

Final Purpose of the Emotions and Sentiments. — We have already seen that it is impossible to account for all the simpler pleasure-pains on the principle that they are obviously favorable to the preservation of the individual and to the development of the species (comp. p. 99 f.). When the more complex forms of developed feeling are studied, the final purpose of them offers a yet more difficult problem. All strong emotions, whether exceedingly depressing ("asthenic") or excessively stimulating ("sthenic"), may be injurious and even dangerous to the integrity of the organism. It has been said that the former kill by laming the heart and the latter by apoplexy. There are two branches of the subject, however, in which a certain amount of teleology seems fairly obvious.

(1) As has already been indicated, many of the motor reactions called forth by the more primitive forms of emotion have a defensive or an offensive purpose to serve. The cerebral excitement of anger naturally overflows into the muscles, which clench the fists, and stiffen the limbs, and erect the body with head thrown back. But when Mr. Spencer argues that the distension of the nostrils in anger was caused by the mouth of "our ancestors" being filled with "a part of an antagonist's body," or that the frown was useful in keeping the sun out of the eyes while engaged in mortal combat, he shows his customary versatility rather than a corresponding regard for undoubted psycho-physical facts.

Moreover, (2) in connection with a wide extension of the pervasive tendency to *sympathetic* feeling, many of the emotions and sentiments operate for the defence and preservation of the species, and for increasing the social solidarity of the race. Indeed, certain of our higher sentiments are the forms of consciousness in which lie the sources of all the highest and choicest human developments. Among them the chief are the æsthetical, the ethical, and the religious.

For further extensions of this line of thinking we must resort to philosophy, whose rational faith Browning expresses in the question: —

> "Put pain from out the world, what room were left
> For thanks to God, for love to man?"

[See Ribot: The Psychology of the Emotions; Spencer: Principles of Psychology, II, § 503 f.; and Darwin: Expression of the Emotions. Compare also Stanley: Evolutionary Psychology of Feeling; Marshall: Pleasure, Pain, and Æsthetics; Maas: Versuch über d. Gefühle; and Leslie Stephen: Science of Ethics, chap. viii.]

CHAPTER XVII

WILL AND CHARACTER

It has already been made abundantly evident that all mental development, especially as a growth in the knowledge of Self, is dependent upon the development of active consciousness, with its added accompaniment of a consciousness of activity. But the form of this development upon which all growth of mind so largely depends must itself now be briefly examined. The word "Will" is customarily chosen to express such psychoses as especially emphasize the side of developed active consciousness. In this way "willing" is made to enter into all mental development; and the development of will is spoken of as giving conditions to the whole stream of consciousness. Thus, too, "willing" (*Wollen*) comes to be thought of as coëxtensive with "acting" (*Handeln*), and even with all that "doing" (*Thun*) which we call *our own.*

It is also apparent, however, that by such a term as this ("Will") there is indicated a complex rather than a perfectly simple and one-sided view of conscious states. The term indicates, indeed, an aspect of all developed mental life, rather than a single faculty, to which we are introduced by legitimate psychological analysis. The significance of this truth will become apparent as discussion proceeds. But the discussion should evidently begin with considering the nature of —

Will as a Development. — That all consciousness is conative, we saw when occupied with a review of the fundamental processes of mental life (Chap. VI). Conation was then regarded as an original datum of man's mental life,—a sort of birthright belonging to every human stream of consciousness. But to exercise "free will"—in any meaning of the term which the ethical and social sciences can regard as psychologically satisfactory—is no man's birthright. It is the result of a complex development. It is, indeed, an achievement which different individuals make in widely different degrees. This development of the faculty called "Will" requires three things, each of which comes only as a maturing product of mental life, and to different individuals in very different degrees. These are (1) the formation of ideals that may be set before the mind to be realized by courses of conduct; (2) the intelligence of means which are to be employed in the effort to realize the ideals; and (3) the so-called power of choice, which is itself a matter of complex and varied development of the conative in connection with other elementary psychical processes.

The varied uses of the word "will" and the connections of the term with passionate discussions in ethics and religion (over "freedom,' "responsibility," "determination," and even the righteousness of the Divine Government) render it undesirable for the uses of the psychologist. Höffding has pertinently said: "As in Greek mythology Eros was made one of the oldest and at the same time one of the youngest of the gods, so in psychology the will may, according to the point of view, be represented as the most primitive, or as the most complex and derivative of mental products." But for the "most primitive" of those processes which are customarily described by this word we have already chosen the term "conation." And now for the very complex and varied mental processes which belong to the development of consciousness viewed on its active side, we have no better term left than this,—namely, the "Will." It is our design, however, to confine the following discussion as strictly as possible to the psychologist's standpoint.

It should scarcely be necessary in this connection, to repeat what has been said as to the "interpenetration" of all the other so-called faculties, during the whole course of their development, with the growing influence of will. Or rather, we may say: *it is the willing* *mind, regarded as definitely adopting ends, selecting means, checking or indulging appetencies, planning and controlling, or "succumbing" as respects the trend and issue of the stream of consciousness, which is the fundamental and the impressive thing about all human mental life.*

Nature of a Volition. — The study of the "appetitive" functions and processes of mind (see Chap. VIII), taken in connection with views subsequently established as to the growth of intellection (Chaps. XII and XIII), has prepared the way for an understanding of the nature of a volition. This higher form of conation differs from *mere* primary conation or primitive attention, by being consciously determined according to some recognized content. Volition is conation which knows what it wants. Such conation is involved in the intellectual processes of comparison, when these processes take place *with a view* to knowledge of some object or to some immediate practical end. Whenever the child *will* know whether **A** is or is not like **B**, or *will* conclude from the signs exhibited by some agent as to what that agent is about to do, it exercises a volition. Perhaps the better way to express the same truth is to say that, in all such cases, the intellectual processes themselves become volitional.

By a "volition" we understand, then, a definite conative activity consciously directed toward the realization of some mentally represented end, preceded or accompanied by the condition of desire, and usually accompanied or followed by the feeling of effort. The phrase "accompanied by the condition of desire" lays emphasis on the appetitive nature of the volition; the phrase "accompanied or followed by the feeling of effort" lays emphasis upon the fact that movement and tendency to movement belong naturally to every volition.

Variables in every Volition. — The very nature of a volition, as just described, is such as to admit of a considerable variety in the combination of its characteristic features. The particular modification of consciousness, or the complex conscious state, in which any volition consists, may differ from other volitions in the way in which the following five characteristics are combined: (1) The end toward which the particular volition is directed may be conceived with more or less distinctness. The amount of intellectual clearness modifies the character of the accompanying "deed of will." Inasmuch as the character of every volition depends upon its content, — upon *what* is willed, — as this *content* varies the volition itself varies in character. It is quite a different thing, for example, for the child to will to grasp an attractive bauble and for the man of science to will to enter upon a course of investigation into the correctness of the idea which has just flashed into his mind.

(2) Suppose that two or more *ends* which cannot both be willed present themselves in rapid succession before the mind. Then a "conflict of desires," with their accompanying tendencies to volition, must result. But in perhaps the larger number of cases only one end appears as the content of volition, and the volition itself follows without appearance of conflict. In this way a difference is originated between "unimotived" volitions and other volitions which follow, as solutions of cases of conflict, in the form of a more definite choice.

(3) The amount of *desire*, or of appetitive consciousness, which enters into different volitions varies enormously. This variation is dependent upon temperament, mood, circumstances, and upon the nature of the object in which the volition terminates. Some volitions are pale and nerveless; some are blood-red and swollen with the most intense passion.

(4) There are certain variations of volition which are characterized by the popular language, and which have to do with the way in which the will "goes off," so to speak.

This variation concerns the amount — the more or less — of what is called *deliberation.* The process of "deliberation" itself is a compound of intellection and inhibitory volition. "Hold on while I think" is its formula. But the very volition which terminates the deliberative process varies according to the amount and character of the process itself. The "deed of will" which follows prolonged and painstaking deliberation is itself differently done from that of "reckless" or "hasty" will.

(5) Volitions also differ in an important way according as they stand differently related to the motor organism on which they must rely for their *execution.* Here a distinction may be introduced between (*a*) volitions of inhibition and (*b*) volitions of positive innervation. In the former case (*a*) the "deed of will," during the process of deliberation, seems to resemble a "holding back" of the tendency to do something by immediate use of the bodily organism. The deliberative process terminates by a "letting go," or by a more decided and supposably final "putting down" of the tendency to motion and the strain of resistance to movement. In the latter case (*b*), the "deed of will" often appears as a sort of summoning of energy and a temporary struggle to overcome the resistance of the motor organism. The peculiar feeling of a *nisus* — or contest with the bodily members to get them to do our will — becomes then a most important feature of the volitional consciousness.

Volitions as Determining Factors. — In the metaphysics of ethics, and in many debated questions of sociology and of the other psychological sciences, the inquiry arises, whether the volitions do actually determine modifications in the stream of consciousness. To this inquiry the psychologist, by trying to lay all the emphasis on the word "*actually*," may perhaps reply that metaphysics must be appealed to in order to answer it. For the final and conclusive answer metaphysics must doubtless be held responsible. But the psychologist, as a faithful and unprejudiced student of conscious states just as he finds them, and by the method which cautiously adopts but does not cater or cringe to current conceptions of the students of physical science, *must reply:* Volitions certainly *appear* to determine the sequent psychoses including many of the changes in motor consciousness. This is, indeed, their characteristic peculiarity as studied in their place within the stream of consciousness. And, moreover, the psychologist may reply that, so far as we can ascertain by observation and experiment, volitions *do in fact* (that is, "actually") determine modifications in this so-called "stream."

In understanding such a position as that just taken, several modifications of the more obvious meaning of popular language must be introduced. It is customary to speak of "Will" as a sort of uniquely separable and solely responsible faculty, to which the blame or the praise of conduct must be awarded. It should be remembered that *in every developed volition the whole man acts; and that there is no such thing as a genuine "deed of will" which is not a complex resultant of all the so-called faculties.* I cannot *will* to conduct myself so as to reach any end unless I can frame an idea of that end; nor can I select and use means unless I know what the appropriate means are, or are likely to be; nor can I choose either end or means without the ability to frame and contrast the ideas of several ends and of their appropriate means.

Furthermore, there is no doubt that infants generally, and adults very frequently, will impulsively, and in such manner that the deed of will appears as only one psychosis in a stream which is throughout determined by the intensity and order of external excitements. Over against this class of experiences may be set those in which the volition seems to originate, internally, in the burning of desire or the white heat of passion. Such conscious states may be not unfitly described as *wilful desires* or *voluntary passions.* As Balzac has pertinently said: "Fanaticism, and all other sentiments, are living forces. These forces become in certain beings rivers of Will, which gather up and carry away everything."

These and similar experiences teach that, although the impulsive and emotional contents of consciousness appear to determine the volitions, the volitional, in turn, so interpenetrate and modify the impulsive and emotional as to have the appearance of determining them. That I will what I desire, or am moved with passion to will, is no truer than that I will what I shall desire and that I adopt my passion as the intelligent *motif* for a required "deed of will."

Voluntary Thought and Movements. — That volitions do determine the character of the sequent conscious states is implied in the distinction between voluntary and involuntary thinking or movement. The *seemingly* forceful influence of what we consider as our own willing over the trains of thinking and the movements of the body cannot be denied. In perception the object perceived, and the way in which it is perceived, often appear as something determined by our own volition. This appearance of determining the character of the mental train by "our own" volition is the characteristic of all active recollection, or definite thinking, or constructive work of imagination. The conscious and intelligent "laying down" of judgments, with the conviction of their truthfulness, also appears not infrequently as a quite voluntary affair. I "cannot help" judging this to be true, does not so much mean the confession of a psychical (of course, not a physical) impotency, as the assertion of a voluntary allegiance to the recognized supremacy of intellectual principles. "I *will* be faithful" to the evidence and to my convictions, is often quite as appropriate a way of expressing the same experience.

The facts to prove the truth of this view of the will might be drawn from all the processes which have already been described and analyzed. For these processes are all connected with the development of conation and attention, as taking place synchronously with the development of ideation and of judgment. *In their appearance in consciousness, volitions are not similar to sensations or feelings,* *or ideas, or thoughts, as such; but they are phenomena determinative of the character of all these other states, — in the one stream of consciousness.*

In classifying the different bodily movements (p. 115 f.), some were spoken of as voluntary. These are characterized by three classes of peculiarities which do not belong in the same way to the so-called involuntary movements. Voluntary movements are (1) dependent upon volition, in the stricter meaning of this word as a "deed of will" directed to the realization of an end; they are (2) often suffused in a peculiar way with the "feeling of effort"; and they are (3) executed only with a special motor apparatus, or outfit of striated muscles connected by definite nerve-tracts with the higher areas of the brain. To exhibit the details of the last of these three characteristics belongs to physiology. Our attention has already been called at sufficient length to the second characteristic as indicative, physiologically considered, of the automatic energy of the central nervous mechanism, and, psychologically considered, of the feeling of being active and yet resisted in our activity. The first and central one of the three characteristics is emphasized by observing what are the actual modifications of consciousness which are experienced in all distinctly deliberate and voluntary movements of the body. *Between the desire to move and the idea of the movement desired, on the one hand, and the actually accomplished movement, on the other hand, something intervenes which is unique in psychical character, and which we express fitly by the words:* "**I will.**"

Nature of Choice. — The highest form of volition is that which men designate as a "choice." In the psychological treatment of this phenomenon of consciousness we are most of all compelled to be satisfied with description only. We can tell what appears to introspection as going on in consciousness; we can make a fairly complete picture of what we seem to ourselves to be doing. But here explanation is at a *minimum*. A man's choices often appear to him to come out of the mysterious depths of himself. Nor is this appearance diminished by a careful consideration of the nature of those influences "under which," as it is popularly said, he is conscious of choosing.

Five "moments," or "stages," may be recognized in the most elaborate and complete processes of choosing. They are the following: (1) mental representation of two or more ends regarded as dependent upon conduct; (2) excitement of some desire, emotion, or sentiment, implying a feeling of the value of these ends; (3) more or less of deliberation, or reflective weighing of these values, and of the risks and consequences mentally connected with their choice; (4) decision, or the appropriation to Self of one of these ends to the exclusion of the others — the cutting short of deliberation and the pronouncing of a "fiat of will"; and (5) the more distinct consciousness of doing something or the issuing of the executive volition.

These five "moments" may all be much huddled together; or, on the contrary, the first three of them may be indefinitely drawn out. In either case two things should be observed for the better understanding of this distinctive process. First: in all the first three "moments" of the process of choosing, the will is active; for mental representation, the indulging or restraining of feeling and the acceptance of motives, as well as especially deliberation, are processes that call for voluntary activity. But, second: it is the decision which is, in all deliberate choices, the unique function of will; in it the voluntary Self comes to the realization of its supreme form of development.

Of these five "moments" of choice, two require a brief separate treatment. These are the third and fourth, or the deliberation and the decision.

Nature of Deliberation. — We have seen how largely impulsive and instinctive is all the earlier conscious action of the human infant. But nothing is more suggestive of the experience in which the development of will arises than to observe the infant's early pauses of surprise and his hesitation before "judgment is rendered" and "action entered upon." More and more may this inhibitory suspense itself become a matter of volition. Hence the part which will itself plays in deliberation. It is the growth of experience, however, as a matter of memory and of cognition which enhances the value and enriches the content of the deliberative process. Men learn by experience that it will not do *not* to deliberate, *not* to think about consequences. They learn also what particular consequences to expect from the different courses of conduct whose attractiveness and value they are estimating in the process of deliberation.

The influence of deliberation, in itself considered, upon all the ideational and emotional factors which enter into the process of choosing is too obvious to need detailed consideration. Not infrequently a complete change takes place in our feelings and our ideas while we are deliberating. This is not due simply to the fact that passions have time to cool, desires to grow pale, and ideas to fade away or gather strength and clearness. It is also due to the other fact that *we are ourselves, in the very act of deliberating or estimating our own feelings and ideas, voluntarily determining the conditions of the subsequent choice.* For the distinctive thing about the deliberative process is, not so much its exercise of intelligence, as its voluntary character. It is will preliminary to choice.

Deliberation, since it involves the continuous and planful control of discriminating attention, and the conscious suspension of a deciding judgment until other judgments have been formed and the ideas have been subjected to some standard of value, is a notable manifestation of Will. It is distinctive of the mature human being to deliberate. Thus the development of this faculty differences the adult man — the full-grown Self — from the infant, the idiot, the savage, or the childish and immature adult.

Nature of a Decision. — It is in the fourth "moment" of choice that the supreme manifestation of will appears. This is, indeed, that form of voluntary activity which is fitly called *the* choice. Up to this point the complex mental process consists of a more or less prolonged and slow or rapidly finished alternation of representative ideas with their appropriate affective accompaniments. For example, A, B, and then C, appear in consciousness, and we feel more or less strongly attracted or repelled by each. In a measure, we constantly keep deciding which we will attend to, as actually being somehow entitled (ethically or æsthetically) to have most value for us. But as yet we have not adopted either A, or B, or C, as the idea to be set into reality by our conduct. A, or B, or C; which? This is still the problem. At present it is scarcely C, possibly B, but most likely A, that will be our answer, — "*adopted*," for the solution of this problem. Still, who can tell? Not even we ourselves. *For only the decision decides; only the resolution resolves the problem.*

But now the decision is made; and after all, it is the improbable C which has been adopted rather than the more probable B, or the antecedently almost certain A. Or it is A which we make our own by this "deed of will," — doing it with the feeling that it was absurd for us ever to hesitate and delay over the consideration of a probable B, or a most unlikely C. Or it is B which at last seems fairly forced upon us, because the deliberative process has brought forward a new train of ideas and a flood of feelings, which all enhance the attractiveness or the ideal value of B; and so quite drive both C and A out of our thoughts. But in either case, and in every case of a similar experience, *it is the decision or "cutting-short" of the process of deliberation, in which the will gives supreme expression to itself as developed self-activity.*

This mental phenomenon of decision appears before the psychologist, first of all, as a fact demanding recognition. As a scientific student of all mental phenomena he is bound to accept and describe this fact in its full significance, to explain it partially or wholly, if possible; and then, perhaps, to turn it over to ethics or to the philosophy of mind for further adjustment with our total human experience. Its faithful description emphasizes the following particulars: (1) After making a decision, as well as during the process of deliberation which leads up to the decision, we know that we are "influenced" by motives. That is to say, we know that some ideas "attract" and some "repel" us, and so modify our affective consciousness; and that ideals have different degrees and orders of value in our imagination and judgment. But even in all this we are conscious of "*willing* our own way," in a measure, toward the final decision. (2) In making *any* decision, if it is a real *decision*, and in reflecting upon it after it is made, we have the rational conviction that *it*, in some peculiar and unique sense, *is our very own.* We were more or less strongly influenced, to be sure; and we now believe that the decision was wise or foolish, morally good or bad, as the case may seem to be. But, in any and every case, we did it. If any of our conscious states are ours, then a decision is *a fortiori* ours; if we have any right to believe that we ever do anything, then we ourselves do make (and do not have made for us) our own decisions. (3) When, however, we come to explain to others, or to ourselves, how a decision can really originate in this way, most of our attempted explanation is either a subversion or a reiteration of the fact of experience. I decided; — in the view of considerations A, B, C, etc., to be sure, — but still it was I who decided. I know what it is to act impulsively, to do things, even those that *seem* voluntary, without making any real decision. I do many things this way; but in this case, it was not so. The reasons for my decision were these; and for these reasons, *I* so decided.

Such näive declarations of the facts of consciousness are not, at present, made any more explicable by the researches of a scientific psychology. We doubt whether they will ever be explained; whether they will not always have to be accepted as expressing an ultimate datum of fact. At any rate we are warranted in saying that, *to the existing science of psychology there is nothing known that makes any less unique, mysterious, and impressive, the assumption of an inexplicable spontaneity of conscious mind in making, after deliberation, a decision.*

This is the place to protest against assumptions or alleged proofs which discredit or weaken the character and significance of a conscious and deliberate choice. Even so fair-minded a writer as Höffding has quite gone beyond the limits of scientific hypothesis when he declares: "Psychology, like any other science, must be deterministic; that is to say, it must start from the assumption that the causal law holds good even in the life of the will, just as this law is assumed to be valid for the remaining life and for material nature." Psychology has absolutely no right to any such assumption. Psychology must stick to the facts of consciousness; discover and describe them just as they are; and then, if it can, explain them. But it must not sophisticate them. Among these facts it finds the conscious and deliberate choice. Its appearance is decidedly not that of a phenomenon in which "the causal law holds good, just as this law is assumed to be valid for the remaining life and for material nature." It is rather that of a fact arising in the mysterious depths of the self-directing mind.

When, further, a writer like M. Luys asserts that the consciousness of choosing is illusory and that the object chosen is "only forced on us by the cunning conjuror, the brain," because "the cell-territory where that object resides has been previously set vibrating in the brain," he substitutes a worse than doubtful physiological hypothesis for the psychological explanation of a phenomenon whose significance he begins by plumply denying. Nor does the fact that "will-time" in reaction can be reduced by establishing fixed associations between certain perceptions and assigned modes of selected movement, alter essentially the nature of this problem.

The Formation of Plans. — The more expansive and wide-reaching, though less intense and concentrated, exercise of the developed will is seen in the formation and execution of plans. All volitions and choices are, indeed, purposeful; they contemplate some plan of action. If, for example, I choose to draw the straight line **X** between *A* and *B*, rather than the curved line **Y** between *C* and *D*, or choose to draw a circle rather than a triangle, I am adopting one plan of conduct in preference to another. But deliberate choices, or "deeds of will" that have been "thought out," constitute a sort of hierarchy in the control of conduct. As entering into such comprehensive choices we notice especially the following four variables: (1) Both the end proposed, and the means necessary to the realization of the plan, may be more or less comprehensive in themselves. But *comprehensiveness*, in general, is characteristic of planning as distinguished from choosing in an isolated fashion, as it were. (2) Steadiness or firmness of will — what Sully has expressively referred to as "the very backbone of what we call will" — varies in different plans, and in all the plans of different individuals. But *steadiness* of will is more generally characteristic of plans than of single volitions or choices. (3) The degree of the subsequent modification of the Self which follows the formation of different plans varies greatly. Some terminate quickly, and with unimportant influences over our other mental life, and our habits of action. But others are transforming. And, in general, *control of conduct* belongs to those choices which constitute the formation of a plan. (4) The plans of any man do not all indicate to the same extent the more fundamental emotions, the profounder convictions, the more influential ideas and thoughts, of the man. But the *character* of every man is indicated in the most summary way by the plans he forms and by the way he pursues them.

It is, then, in the formation and execution of plans that the significance of the development of what is called "the human will" becomes most obvious and most important. For it is in this shape that the supremacy of conduct, and the final purpose of mental development for the individual, most clearly appear. These two truths, then, belong especially to the psychology of the will as engaged in the formation and execution of plans: (1) *The intimate connection between developed conation and motor consciousness, between choices, and the tensions and movements of the muscular organism as necessary to the realization of the choices, makes what we call "conduct"* (as distinguished from mere action) *possible.* All the psychical development thus culminates and expresses itself in planful, voluntary action. What I do according to a chosen plan, how I manage myself in a large and comprehensive and intelligent way, — that is, especially, what I have come to be.

For (2) *it is the formation and execution of plans which chiefly constitutes the real unity of our psychical development, so far as such unity is under our own control.* It is planful will that welds together the other faculties in their manifestations and developments. Thus not only is what we will made dependent upon what we think, and what we will on what we wish, but what we think and wish is subordinate to a comprehensive and steadfast will.

The superiority of man to the lower animals confessedly consists, to a large extent, in his being able to develop, adopt, and execute far-reaching plans. All the other animals behave, indeed, in a planful way. But consciously to espouse, and with fair consistency to follow, ideals whose realization is set in the future, is the distinguishing power of man as compared with them. Thus his superiority manifests itself in his foolishness and mistakes and crimes quite as unmistakably as in his wise and upright plans. It is one of the secret sources of his success in science, art, and in the construction of social institutions. The psychological character of such supremacy is complex. It consists in intellectual excellences; in his endowment with a number of vague and yet influential, emotional and sentimental tendencies; and even in the superiority of his bodily organism, with its apparatus for articulate language, its deftness of hand, its upright posture, and large-sized controlling brain. But it is also, and pre-eminently, a matter of the grasp and steadiness of will. In larger measure far than any of the other animals, man can lay hold of, and shape and mould his conduct, his very *Self*, according to an ideally valuable plan. Thus the Paracelsus of Browning surpasses the ape, the child, and the savage; because he can say: —

> "I have subdued my life to the one purpose
> Whereto I ordained it;"

or, again: —

> "I have made my life consist of one idea."

The Consciousness of Freedom. — The offices of psychology in the settlement of disputed questions in metaphysics and theology have been nowhere more abused than in strife over the so-called "freedom of the will." We have already seen that psychology does not justify this term, if by "the will" we are to understand an isolated faculty that is somehow naturally endowed with a quality called that of "being free." But the psychologist, as a faithful student of the phenomena of consciousness, notes how one of the parties to this strife is accustomed to deny or explain away the facts of consciousness; and how the other party is tempted to exaggerate and overstrain the testimony which consciousness yields in the form of certain undoubted and important facts.

The conscious processes on which the conviction "I am free" are founded, or in which this conviction is involved, have already been stated. They are no other than the processes of choice; and especially, in an intensive way, the nature of decision, and, in an extensive way, the formation and execution of plans. To sum them up, they are all expressed, in a positive way, by the assertion: *I* will; the decision is made *by me*. I consciously make up my own mind. Expressed in a negative way, however, this conviction appears equivalent to a denial that any influence, even that of my own desires and emotions, compels me. The choice is a deed of my will; and in making it, I am not forced, or compelled, or consciously determined (in any other than the way of rational influence) to make it as I do.

To claim that the above-mentioned facts constitute an immediate and indubitable testimony to the freedom of the Self from law, or from all causal connection with the rest of the world, or to the independence of mind on brain, is quite to overstate the characteristic impression of the facts. But, on the other hand, this sort of an experience cannot be resolved into the *bare* consciousness of acting under influence, rather than by compulsion; or into a consciousness of acting, with an added consciousness of being ignorant of all the reasons for the particular form of the action. *When I deliberately choose, the complexion of the stream of my consciousness — so to speak — is the very opposite of that which can properly be described as passive, compulsory, or determined by unknown causes.*

This characteristic consciousness may be further described by contrast with those cases of willing where the conviction of "freedom" is impaired or lost. Such cases are those of persistent hallucinations, or of phrensied emotional excitements, which become "too strong" to be inhibited or controlled by will. The conviction is then more fitly represented by saying, "I will, *because* I cannot help it." A similar conviction accompanies the experience of those who, without such hallucinations or emotions, suffer from so-called "impotency" or "disease" of will. The wildly excited or persistently solicited will, as well as the morbidly nerveless and doless, may make so-called choices under the sense of compulsion. On the other hand, the insane or hypnotic as well as the normal consciousness may have a clear and strong conviction of being free in willing; and yet, from other sources than this consciousness, it may be discovered that the choice was ingeniously solicited or largely "forced." Such cases are not, however, to be considered parallel with those deliberate and firm resolutions of will, backed up by mighty passions or worthy sentiments, which cling to the pursuit of consciously accepted ideals. Luther's "God help me; I cannot otherwise" is a very different thing, psychologically considered, from the child's whimpering "I couldn't help it," or the kleptomaniac's plea of "Guilty; but compelled to do as I did."

The Fact of Imputability. — The attribution of the "deed of will" to the Self, especially in the forms of decision and planning, follows from the consciousness of "being free" in willing. The conception of "imputability" and of resulting "responsibility" follows from the joint influence of the doer's ethical sentiment and his apprehension of the prevalent social judgment. Who did this thing? is a question which both the individual and society are always asking. If I remember that I willed it, I say in the fuller meaning of the words: I did it. If it was done by me as a matter of my choice, I am required by society, as well as by my own consciousness, to assume responsibility for it.

It is important, however, to notice that the distinctions which the social development of man makes and enforces are by no means very nice here. As to imputability, there is little hesitation or doubt, as soon as the question, To what Self can this doing be ascribed? has been answered. But different communities and eras of civilization, as well as different individual theologians and moralists, vary enormously in their estimates as to what are the nature, the limits, and the grounds of responsibility.

At this point descriptive psychology is compelled to hand over the theory of will, its freedom and development, to the researches of comparative ethics and to the reflections of the philosopher. Yet in doing this it seems to have brought us to the place where we have to acknowledge that, *not something external to consciousness, but something manifesting itself in consciousness, contains the secret of man's mental life and mental development.*

The Formation of Character. — All that has been said in this chapter has been introductory to a most important conception. This conception is best expressed by the word "Character," in the narrower and more carefully limited meaning of the word. In such a meaning of the word we ideally separate off, from the obvious characteristics of the stream of consciousness, something which seems to be more permanent and to lie lower down. Of such more permanent and profound characteristics of this stream, we further constitute two divisions. To the first division belongs what we vaguely call our "nature," our "disposition," or "temperament"; to the second we ascribe our *self-formed habits of will.* The habitual modes of my voluntary reactions I call my "character" in the narrower meaning of the word.

Two remarks at once suggest themselves: (1) We cannot, in fact, carry out into details the separation between nature or disposition and character. Yet (2) in our estimate of ourselves and of others we are compelled, in the interests of reason itself, to make the distinction; and to carry it out as best we may. It does not belong to descriptive psychology, however, to criticise and to validate or reject the distinction. The psychologist sees how such a distinction necessarily arises from our observation of the differences existing between those more impulsive and appetitive conations and volitions with which human life begins, and which continue in all its lower forms of development, and those more highly self-conscious and purposeful choices which the developed man recognizes as most especially his own. It is the latter, which, when solidified and organized into habitual modes of the higher reactions of will, he calls his "character."

The significance of the distinction between nature or disposition and character is very important both for our practical estimate of the merit of conduct and for ethical philosophy. Among rude and savage peoples notions of the responsibility for conduct are little governed by such a distinction. The same thing is true of the distinction between responsibility and imputability. Among such peoples those individuals who are regarded as inspired, or possessed, or otherwise controlled by some indwelling agent, may still be held responsible for deeds not clearly or fully imputed to them. The feeling of responsibility for the sins of the nation or tribe, which is so strong in certain communities, affords another interesting class of phenomena bearing on this problem. In the doctrine of metempsychosis, the praise and blame which our modern ethics consider merited only according to character may be awarded according to the nature of the individual. Certain systems of theology, as is well known, have founded themselves on a psychology which refuses to distinguish between nature and character, or between the most vague form of imputability and the strictest form of responsibility.

The Education of Will. — Since the formation of character according to right ideas is the supreme end of all education, the development of will is essential to successful education. Three things are particularly to be noted as bearing on this development: (1) The desirability of getting the habits of bodily movement formed as early as possible, in accordance with considerations of economy, ease, pleasure, and of a higher æsthetical and ethical order. Thus the conscious control of life is facilitated by the services of a good automaton.

(2) The formation of correct habits of attention is also one important part of the development of the will. In its higher applications this means the securing of conscious selection and fixation for the ideals of conduct; and the intelligent discrimination and use of the means necessary for their realization.

(3) Then follows the construction of a system of principles of conduct, which must not rule with rods of iron over a rigid and unbending subject of volition; but which must secure a blending of that uniformity which is necessary to give unity, with that capacity for constant read-

justment which is necessary to all genuine and successful development of the higher mental life.

[In addition to works already referred to, consult on the consciousness of self-activity and the origin of the law of causation, the author's Philosophy of Mind and Philosophy of Knowledge (as already referred to). See also Galton: Inquiries into Human Faculty; Ribot: Diseases of the Will; Hazard: Causation and Freedom in Willing; Fouillée: La Liberté et la Déterminisme; Wiese: Die Bildung d. Willens; Schellwien: Der Wille die Quelle d. Bewusstseins.]

CHAPTER XVIII

TYPES AND PRINCIPLES OF MENTAL DEVELOPMENT

The phenomena of man's mental life exhibit to the trained observer an almost indefinite variability. This truth applies to different individuals, whether we consider (*a*) the variations in the most elementary psychical processes, or (*b*) the various combinations of these processes into so-called "faculties," or (*c*) the entire course of development which is followed in the life of the individual. In spite of this variability, however, the existence of a science of psychology implies the possibility of reducing the phenomena to some common terms.

The foregoing remarks apply even to normal individuals. Besides these, however, there are not a few cases which show marked development of certain characteristics amounting to mental "idiosyncracies." Such are the musical or mathematical prodigies, those born with strong tendencies to strange crime, or the men and women with rare natural gifts and talents — not to speak of the geniuses. Moreover, all *normal* individuals (if we are to use this somewhat vague adjective) are at times subject to variations in the principal characteristics of their mental processes which deserve to be called more or less *abnormal.* The use of these contrasted terms — "normal" and "abnormal" — is necessarily somewhat vague. Some psychologists, for example, would hesitate to speak of the phenomena of dream-life as abnormal; and, indeed, the psychology of dreams, so far as these phenomena have been subjected to scientific investigation, does not depart essentially from the psychology of waking conscious states. It is now known also that a very considerable proportion of individuals may, without great difficulty, be made the subjects of hypnosis. And we have repeatedly had occasion to remark how illusions and hallucinations mix with the ordinary consciousness of most persons.

In spite of this indefinite variability, and in spite of the impossibility of drawing hard and fast lines between the normal and the abnormal processes of mental life, we may discover in this life certain —

Types and General Principles. — In a somewhat rough but serviceable way it is possible to group individual minds together under very general classes. It is also possible to regard all the forms of mental development — the formation of faculty and the combined growth of "powers" — as subject to a few general laws. The result is a certain psychological doctrine of types and of principles applicable to all growth of human minds. The basis for a recognition of "types" of mental growth is laid in the fact that, although individuals vary indefinitely, these variations themselves may be subjected to a process of grouping. **A** differs from every other individual human being in many particulars; it is in these differences and in their method of combination, that the *individuality* of **A** consists. At the same time **A** is, in general, more like **B** than he is like either **C** or **D**; and these latter two, although differing in many particulars, are more like each other than they are like either **B** or **A**.

Various groupings of individuals may be made according to Temperament, Sex, Age, and Race. These groupings result in a variety of "types" under one or more of which each individual may be assumed to find himself arranged. In any attempted arrangement of individuals under the last three of these groups, we are guided by certain physical facts which it is, in all ordinary circumstances, not impossible to ascertain. But the study of the correlated psychical facts leads us at once into doubtful and disputed fields of investigation. A certain amount of definiteness, however, must be allowed to both the current and the more scientific conceptions of the "male" and the "female" disposition or character, the psychical characteristics of childhood, maturity, and old age, the ways of thinking and feeling that are peculiar to the Oriental or Occidental, the Anglo-Saxon or the Latin, mind, etc. In dealing with the matter of temperament both the psychical side, and the physiological basis of the distinctions made, are obscure and shifting. It is not at all strange, then, that the psychology of the mental "types" belonging to any one of these four groups is scarcely to be spoken of as a *scientific* affair.

One can scarcely speak of "laws" in psychology, in the sense in which this word applies to the phenomena treated by the physical and natural sciences. This inability seems to be chiefly due to two causes: (1) the combinations of influences which enter into the developed mental processes are so subtile and manifold as to make the reduction of them to any system of definite formulas exceedingly difficult; but, more especially (2) the mind, considered as the subject of laws called mental, is also known as the willing subject, and so as deciding, within not easily assignable limits, its own course in development. It still remains true, however, that certain principles of universal character and profound import appear in control, so to speak, over all the activity and growth of every individual mind. These principles may then be said to belong to all human mental development.

A study of the mental processes of man, considered in their development and from the highest attainable points of view, leads to the recognition of at least four such principles. These are the principles of Continuity, Relativity, Solidarity, and Teleological Import.

The modern scientific interest in all the various "abnormal" phenomena of mental life is most promising. But the psychologist, who is determined to maintain the truly scientific attitude toward such phenomena and toward the study of them, will avoid two extremes. On the one hand, he will not refuse to entertain evidence as to all alleged facts; nor will he remain stolidly resolved not to allow any amount of evidence to swerve him from his present theoretical position as to the nature and the possibilities of the human mind. But on the other hand, the true scientific procedure in psychology, as in every other form of science, is from the known to the unknown, from the already explained to the still unexplained. The further the student of psychology advances into his science, the more, in our judgment, does he become convinced that the causes of seemingly new mysteries (in telepathy, clairvoyance, double consciousness, etc.) are to be sought by following clews which are already in hand.

For example, no important gap appears between that "dramatic sundering" of the Self, in which children indulge at play and which what is called conscience forces upon us all, or in which the great actor is a trained expert, and the "double consciousness" of the hypnotic, or the insane. No wholly new ethics seems demanded, as yet, by any of the clearly ascertained facts put forward in the name of the most fanciful of the modern school of criminologists. And we shall see in the next chapter that the relations of body and mind have not been essentially altered by any of the most recent discoveries in cerebral physiology.

Nature of the Temperaments. — It is a very ancient persuasion that men may be divided into groups on the basis of certain marked characteristics with which the course of their mental development sets out from the beginning. Since what appears from the beginning of such development must somehow be included in the bodily organism, these characteristic differences must be assigned for their initial points, as it were, to this organism. Thus, by "a Temperament" is understood *any marked type of* *mental constitution and development due to inherited characteristics of the bodily organism.*

It must be confessed that there is great difficulty in placing the doctrine of temperaments, in the form in which it has just been stated, upon a truly scientific basis. On the whole, however, modern science seems to favor some such doctrine. The study of human physiology and psychology, in their joint work, requires us especially to emphasize the following two sets of considerations: (1) It is the original constitution of the *nervous system* in which the basis of differences in temperament is laid. Different nervous systems differ, "naturally," as respects the degree of their sensitiveness to stimuli, the rapidity and duration of their response to different stimuli, and the facility with which certain combinations, rather than others, are made by the central organs. But, of course, no nervous system can be considered as functioning independently of the other bodily organs. Three other systems of organs, as they get expression in the nervous system, are particularly concerned in the determination of every individual's temperament: these are (*a*) the vaso-motor, (*b*) the digestive, and (*c*) the muscular.

But (2) we have already seen that the psychological doctrine of the development of will leads us to distinguish character from the original mental "constitution" (as we vaguely say), built upon a basis of inherited characteristics. Men's characters change; or, rather, men change their characters. But the doctrine of temperament requires us to admit something permanent which changes of character may partially conceal, or overlay, but cannot change. All this is doubtless very vague and difficult, or impossible, to follow into details. But, on the whole, it seems to warrant this conclusion: *Self-determination as respects character is limited by that determination of the Self which reposes upon an inherited physical* *constitution.* Every individual can do something, perhaps much, toward "the making of" his Self; but in all such doing he is limited by certain original and unchanging tendencies, that are embodied in an inherited nervous system, as itself influenced by the characteristic vasomotor, digestive, and muscular functions of that particular individual.

If now inquiry be made as to a more precise description of those variables in the reactions of the nervous system which enter into the constitution of the different temperaments, it is not difficult to distinguish the following: — variables (1) in the kind of reaction; (2) in the measure of sensitiveness shown; (3) in duration and conservative energy for laying the basis of cerebral habit; (4) in rapidity of production; (5) in completeness of reproduction; (6) in rapidity of combination; (7) in the kinds of combination most favored; but especially (8) in the characteristic accompaniments of feeling.

Kinds of Temperament. — Considering the indefiniteness of the whole subject there has been a remarkable agreement as to the number and character of the groups of individuals formed when they are classified according to temperament. This agreement is the more remarkable because the principles upon which any system of grouping should be carried out are still in dispute. Four kinds of temperament have been almost universally agreed upon; and to these four the names Sanguine, Choleric, Phlegmatic, and Melancholic or Sentimental (or "poetic"), have now been accorded.

A certain type of individuals, which may be met with in both sexes, in all races, and in different ages (although most clearly distinguished in middle life) is characterized by a lively and varied excitability under the different forms of impression, with habitually rapid change, but without corresponding depth and stability. These are called *sanguine* temperaments. Another type is scarcely less quick, but is less varied in its reactions; while the reactions are more enduring, passionate, and determined, and the forms of conduct as well as the conscious states are less liable to change. These are the men of *choleric* temperament. Still another type is characteristically sluggish, the opposite of lively and versatile; although it may be either tenacious or lacking in respect of what is called will. To such the name *phlegmatic* has been assigned. The fourth type is less easily described. It may be called the *poetic* temperament. Persons of this type are lively in imagination, susceptible to impressions of sense, moody in feeling, uncertain in conduct.

It is interesting to notice that one set of terms for the various temperaments is astrological in origin. In being born under the influence of the different planets the older theory found a sufficient reason why one man should be "Jovial," another "Saturnine," and still another "Mercurial," in temperament. Some advance was made in the explanation of such constitutional differences, when they were ascribed to the circulatory and digestive systems. Thus the sanguine or "full-blooded" man differed from the phlegmatic or "full-phlegmed" man; and as well from the choleric or melancholic man who was "full of bile." A mixture of such influences seems to have been imagined at work in the case of him whom Shakespeare describes as of "that surly spirit, melancholy," which "baked" the blood and made it "heavy, thick."

Even so modern a psychologist as Wundt thinks that the conception of temperament may properly be applied to different ages and races of men, and to different species of animals. Undoubtedly youth is more naturally sanguine or sentimental, maturity more choleric, old age more phlegmatic. In general, women are more sentimental; men more choleric. Perhaps one might venture to call the French characteristically sanguine, the Dutch phlegmatic, the English a mixture of phlegmatic and choleric, the Japanese sentimental. But neither in individuals nor in races do we find any of the types perfectly "pure"; and so examples taken from each class shade away into each other.

Differences of Sex. — The fundamental physical differences of the two sexes are, many of them, obvious enough. Of such differences some are nearly constant, some periodic, and some epochal. The minuter histological and the detailed functional differences are very numerous and doubtless influential; but they are difficult as yet to establish in a thoroughly indisputable and scientific way. From birth onward, through all the ages to maturity and old age, the average brain of the male surpasses in size and weight that of the female. But this difference seems to be chiefly expressive of the difference in the total weight and size of the body, and in the amount and adjustment of muscular development.

These grosser bodily differences of the sexes are very important in determining a variety of rather massive psychical differences. Taken together they make up a characteristically different basis for mental development. The complicated sensory-motor organism is of the most essential influence in all the characteristic and habitual functions that enter into the total growth of self-consciousness and of a conception of Self. The control of this mechanism for the realization of practical ends involves the training of the faculties of sense-perception, of judgment, and of will. The sexual differences are thus made to reach all the way from the "feeling-deftness" of the feminine type as compared with the superior tactual discrimination and muscular precision of man, to those abstract conceptions of space in which Lotze thinks that the two sexes differ so widely.

There is sufficient ground for the popular impression that the sexes differ characteristically in respect of the emotional and sentimental factors of the conscious states; and this difference, too, can in a measure be referred to a difference in the bodily organism. It has already been said that the feminine temperament is more especially sanguine or sentimental; the masculine more probably choleric or phlegmatic. There are, however, marked instances of all the four kinds of temperament to be discovered in both sexes. As a rule, the sexual differences interpenetrate the different temperaments; so that the sanguine man differs from the sanguine woman, the choleric man from the choleric woman, etc. It is undoubtedly among males of a sanguine or sentimental temperament that most womanish men are to be found; and it is masculine women that are more likely to be choleric or phlegmatic in temperament. Such differences as these are plainly, to a large extent, characterized by the habitual forms of emotion and sentiment. It is to literature, and especially to poetry and the novel, that we must go for the more satisfactory descriptions of the sexual differences in all those forms of the life of feeling which both sexes share in common. For such descriptions are rather matters of art than of science.

The psychologist can scarcely discuss the question of differences of sex, in respect of the higher intellectual faculties and the life of conduct,—unless, indeed, he takes his psychological insight into the reading of history and biography, and into the general questions of ethics, anthropology, and the evolution of society. Here, in our judgment, the conviction will be deepened and enlarged, that what has thus far been found true in science, philosophy, and art, will continue essentially unchanged for a long time to come. In these spheres the differences of man and woman, in the amount of productive activity and in the characteristics of the work produced, will probably undergo no essential alteration. The forces which result in these differences lie too deep to be "trained out" of the race. They themselves set the conditions, and they should be followed as the guides of all the process of training. What faculties *are* "higher," and what conduct *is* morally "better," constitute preliminary inquiries into which descriptive psychology is not bound to enter.

We wish, however, to record our protest against the heat and prejudice which render it so difficult to secure any satisfactory discussion of the so-called "woman question" from competent sources. We wish also to express the belief that, both on the physiological and on the psychological side, the differences between the two sexes are minute and influential, and that they pervade the entire psycho-physical constitution. The proposal to train away these differences, or greatly to alter them by changing the environment, we consider vain and foolish. The distinction in sex pervades every form of life; it is itself a distinction on which the most fundamental biological differences are based.

Differences of Age. — All the previous descriptions of the book have taken the matter of age largely into account. This belonged of necessity to our study of mental life as a development. It has been characteristic of all this study, however, to recognize that the birth of mind cannot be observed as can the birth of the body. Neither is there a scientific embryology of the mind as there is of the unhatched chick, or even of the pre-natal human organism. And after the stream of consciousness has begun visibly to flow, with the observer's eye directed in scientific curiosity upon it, its marked periods — the epochal minutes, or hours, or days — cannot be satisfactorily traced by the psychologist.

The psychology of infancy and of childhood is becoming an increasingly prominent branch of the general science of mind. It requires, for even the most moderate success, a much higher order of talent and a more complete equipment of knowledge, than can ordinarily be secured for it. As yet, the additions that have been made in this way to the sum of those truths, which can claim a valid and secure place in the science of psychology, are very few.

We cannot enter upon the detailed description of those differences in the conscious processes which are characteristic of the different ages. The following general truths should, however, be borne in mind: (1) The organs of the nervous system of the infant, especially the end-organs of sense and the higher central organs, are, at birth, developed far in advance of any corresponding psychical development. Their condition is not expressive of mental processes that have been; nor are their functions exact correlates of what is. *In its constitution and functions the nervous system of the newly born human being is prophetic of what is to come.* (2) The earlier conscious processes of the infant are mainly of the impulsive and instinctive order. They are the functioning of a psychical mechanism which is dependent upon the excitement of the sensory-motor centres of the brain. But (3) from the earliest dawn of consciousness discriminating attention is at its organizing work. It is fitfully and feebly, but none the less surely, beginning the wonderful task of forming those faculties which, in their organic relations and growth, constitute a human mind. (4) Inasmuch, then, as we cannot get this progressive organization of mentality out of the confused and chaotic material of sensation and representation, and yet can never put our finger upon the moment when what we call mind begins to be, we are obliged to assume it as a principle operative from the beginning. The psychologist cannot say: "Look, just now, and there; and you will note the first beginning of a human mind." He can only say, in acknowledgment of the limits of all his descriptive and explanatory history of the mental processes: "*In the beginning was Mind, already equipped to receive sense-impressions, to attend, to discriminate, to feel, to form its own faculties of the more complex and higher sort.*"

Differences of Race. — We have just referred to the attempt to ascribe different temperaments, as characteristic to the different races of men. That this, and all similar attempts have some sure basis in facts of experience, there is no good reason to doubt. The truth is of interest to psychology of the most general kind, as showing how diversified are the types of development of which human "nature" is capable. But the applications of this truth belong to the field of comparative or race psychology.

It has already been said that we can scarcely speak of "*laws*" as ruling over the mental development, in the same meaning in which we apply such a phrase to the scientific determination of the behavior of things. But then, biology is not as yet prepared to match physics or chemistry with a show of general formulas that are made with the same approximation to exactness, and that may be stated in unmistakable mathematical terms. And psychology is a biological science. It aims at the descriptive and orderly history of a peculiar form of life. The special reasons for excusing its confessed inability to lay down such general and inexorable laws have been repeatedly indicated.

When, then, we are reminded that "psychology is still in the condition of chemistry before Lavoisier," there is no need to be greatly depressed. There is little ground to expect the rise of a Newton or a Copernicus to deliver psychology from this "unscientific" condition. So far as the natural differences between this science and astronomy, or physics, or chemistry, extend, — and this is very far, — we shall probably have to remain content with our inability to lay down laws in psychology resembling those of the more "exact sciences."

Four general principles have already been announced as applying to the total course of mental development. Among them we consider, first, —

The Principle of Continuity. — A look back over the course followed in our study of the phenomena of consciousness discloses the following principle: *In the mental life re-*

garded as a development, no breaks or sudden leaps are found, whether as between its processes and so-called faculties, or between the successive states and stages of this development.

This principle of continuity applies to the different fundamental processes of the mental life. These processes may, indeed, be distinguished; they may even be considered as separable factors of each individual complex state. But they all fall under the principle of continuity. The different classes of sensations show a tendency to arrange themselves in "scales," in which shades of quality merge into each other, so that the distinctions are not absolute. This is especially marked in the senses of sight, hearing, and touch; but suggestions of it are not wanting in taste and smell, as analyzed by modern experimental methods. In all the psychological doctrine of the intensity of sensations, it is the "differential" unit, the "least perceptible difference," the nicety of the grading of the quantity, which is the important thing. All kinds of sensations, as respects their quantity, may be arranged in continuous series, the different members of which are experienced as contiguous.

Turning to the aspect of feeling, we are met with the apparently irreconcilable opposition between pleasure and pain. Here, however, the continuous character of the scale of intensity helps to soften the opposition. Moreover, the primary forms of emotion shade into one another by almost imperceptible degrees. In the more complex emotional conditions, the presence of common and characteristically like elements of "bodily resonance" forms another class of connecting links. While of the higher and purer forms of sentiment we are often unable to say whether they are most properly classed as intellectual, or æsthetical, or ethical, or religious.

In treating of the development of mental life we recognize the important distinctions involved in the doctrine of so-called faculties. But one of the most valuable results of psychological analysis is to show the presence of all the elementary processes in the formation of the faculties themselves, — although in various combinations and degrees of perfect blending. Perception, for example, cannot be accomplished without involving ideation, feeling, memory, discrimination, and conation. Some of these most elementary processes shade into each other in such manner that, as in the case of the biological distinction between the plant and the animal, strict definition fails us at the extreme limits. Between **S**, the sensation-original, and **I**, the image-representative, all degrees of life-likeness may be interpolated.

We do, indeed, seem to reach a limit to the principle of continuity when we make the analysis of every mental state or process into intellection, feeling, and conation. Neither of these aspects of mentality can be reduced to the other, or made precisely continuous with the other. Yet we are at once reminded of the fact that, until about the time of Kant, it was customary to reduce the number of the "faculties" to two; and that, since Kant, the Herbartian school has given currency to a theory of psychology which would bring feeling and will under terms of the one faculty of the "forth-putting of ideas." The psychologist who remains faithful to the facts of consciousness cannot, it seems to us, adopt either of these forms of the denial of the threefold nature of mentality. On the other hand, he must not emphasize this three-foldness so as to destroy the unity of consciousness. And this fundamental fact of a unity which somehow lies back of all possibility of analysis into faculties, and which makes even the "splitting off" which occurs in double consciousness possible, itself illustrates the very principle of continuity. Nay: it *is* this principle of continuity which has been traced to its origin in the actual, continuous activity and development of the one mind, functioning in its uniquely characteristic, three-fold way.

For, finally, the nature of all mental development illustrates and enforces the principle of continuity. What every mind experiences and grows into is not adequately to be described in terms of any number of functions, or faculties, regarded *merely* as functions and faculties. Its full significance is told only when it is recognized as the continuous development of a being which comes to know itself as a Soul or Mind.

The Principle of Relativity. — Closely connected with the foregoing principle is another, which may be stated somewhat as follows: *The character of every individual process, whether elementary or complex, and of every form of mental life, is dependent upon its relation to other processes and forms of the same mental life.*

The psychological principle of relativity must not be confounded with the metaphysical proposition, "To be is to be related" (Lotze), or with the theory that every conscious presentation is "essentially nothing but" a transition or difference (Bain). The principle means rather that no conscious process can be faithfully and fully described — what it actually is, and what it is worth, estimated and set forth — without reference to its place and its connections in the stream of consciousness. Mental states cannot be taken out of their relations to the life of the one Subject of them all. Although it is the task of the psychologist to consider these conscious states, "as such," they are never, in fact, *mere* states; they are always *somebody's* states, and are what they are, as related to other states of the same mind. The proofs of this principle are to be derived from all departments of psychology and from each example under each department. The psychologist's analysis resolves the mental life into a series of relatively simple and self-existent processes, whose characteristics he proceeds to investigate: but the real mental life is not so. The processes which he labels A, B, C, etc., are never, in fact, abstract and independently existent; they are A, B, C, etc., instead of A_1, B_1, C_1, etc., or A^x, A^y, A^z, etc., always and only in dependence upon the relations they sustain to the whole alphabet of that particular mind's experience.

Of each particular mental process, or conscious state, it must also be held that its peculiar characteristics are dependent upon the relation it sustains to the most nearly contiguous processes, or states.

This principle of relativity has been much misunderstood and frequently misstated. In the form which resolves all mental presentations into "nothing but" consciousness of difference, we agree with Dr. Ward in finding it unsatisfactory. But when this writer goes on to say that "in passing from the scent of a rose to the sound of a gong or the sting of a bee, we have no means of bringing the two into relation," he seems to us not faithful to the actual facts of mental life. The truth of fact is rather that the character of one's previous absorption in the scent of the rose would largely determine the perception of the sound or feeling of the pain of the bee's sting. So, too, when Dr. Ward remarks that "a letter-sorter who identifies an ounce or two ounces with remarkable exactness identifies each for itself and not the first as half the second," he states in an inadequate way a psychical fact which illustrates the very principle against which he is contending. For this "identification" is a complex psychical act of sensation and discrimination, every factor of which falls under the principle of relativity. The *identification, psychically considered, is* the conscious relating of a felt sensation to a vaguely discerned memory-image of previous sensory experiences.

Bringing these two principles together we may say that *the true picture of a mental life is that of a continuum (or "stream") of interdependent psychoses.* This is nearly equivalent to saying that every mind is known as an actual development. The very nature of this development makes the successive states dependently related.

The Principle of Solidarity. — When, however, the entire mental life, regarded as an actual development, is taken into the account, we find it showing a constantly increasing tendency toward what may properly be designated as a "solidarity" of experience. In general the plasticity of the earlier stages of the mental development is lost; the characteristics of the prevalent psychoses become more definitely fixed; the reign of habit is extended. All this leads to the recognition of the following truth: *The effect of every partial or complete working of the psycho-physical mechanism is felt upon the character of the entire development of the mind; and this development necessarily tends towards some kind of unification.*

It is customary for psychologists to recognize a so-called "law of habit." But it represents the truth of experience better to say that the formation of a *system of habits* is both a primal necessity and also the resultant of the coöperation of the most fundamental principles, of both the bodily and the mental development. "Habit" is not a word to be applied to any one law; it is the essential idea implied in all psycho-physical laws.

In understanding the principle of solidarity these three classes of facts must be taken into account: (1) Every form of organic or more purely psychical activity, having once occurred, is more likely to recur again. The frequency of repetition, taken into relation with other habitual forms of action, measures in a rough way the strength of the tendency, or disposition, to act in a similar way.

But (2) profound changes in the conscious states accompany the frequent recurrence of any form of organic or more purely psychical activity. Of these changes may be noted (*a*) the modifications of the accompanying feelings which take place. Frequently repeated organic processes come to be differently felt, or not to be felt at all, when they recur. For (*b*) a decrease in conscious attention, and in the hesitation which such attention often occasions, follows upon the frequent repetition of any form of the psycho-physical life. Yet (*c*) promptness and accuracy increase, as the necessity for conscious attention and discrimination decreases. *The whole affair comes to be organized into the psycho-physical mechanism.* But (*d*) even where the habitual activity does not become quite purely mechanical, the process of ideation and of thinking which leads up to the movement becomes more automatic and greatly condensed.

Thus (3) the relation of the principle of solidarity to the formation of character, and to the culture and satisfaction of the higher ethical and æsthetical sentiments, is most important. From the point of view of the "willing" mind, we may speak of "forming" and "having habits." From the point of view of this principle, we seem compelled to speak of habits as "having" and "holding" us.

For our weal or for our woe, whether as we will or as we would not, it makes no difference with this inexorable principle. A sort of solidarity, or unification of mental development, inevitably results from its never ceasing application to the life of the body and of the mind.

In all that has been said about the physiological conditions of the different classes of conscious processes, the principle under which habits are formed has been illustrated. The cerebral conditions of ideation, as ideation enters into all mental development, show how the brain of the infant necessarily parts with its original plasticity. The entire psychological doctrine of the formation of faculty — the learning to know anything, to think to any purpose, to form and carry out any plan, or to execute any movement — implies the universal application of this same principle. There is abundant experience — sometimes pleasant and encouraging, and sometimes sad and discouraging — to show us all how deeply set into the psycho-physical organism, and into the very structure of the soul, our habits become.

The Principle of Teleological Import. — The different forms of bodily and mental activity, so far as we can study them separately, show the principle of final purpose as ruling, more or less constantly and completely, over them all. We are not now speaking of any doubtful metaphysical theory. We are taking rather the biological point of view, as it falls to the scientific student of this particular form of life. *In some sort, the different forms of psychical processes constitute an organism; and activity to some purpose is the ruling principle of mental development.*

If the principle of final purpose were not observed in the construction of what we call the mind, and in the combination and development of those activities which psychology recognizes as belonging to the stream of consciousness, no *development* could possibly take place. To take one example of what admits of an indefinite amount of illustration, — if the impulsive and instinctive movements of the infant did not serve the purpose, not only of keeping alive its physical organism but also of stimulating, guiding, and developing the life of ideation and thought, no intellectual growth would be possible. And, indeed, every special kind of a psychical process can be understood only as it fits in with the others and contributes to a sort of unity.

But man differs from all the other animals in the largeness of the part which he, as the conscious subject of states, takes in his own development. The self-conscious, intelligent adoption of plans, and the selection of means, is the *acme* of his superiority, as a willing mind. These plans may include the control of his entire life in relation to consciously accepted ideals of an æsthetical or ethical kind. Thus he may become aware of an import to his entire mental development which reaches far beyond that development itself.

It is a combination of the principles of continuity, relativity, solidarity, and teleological import, which secures for every stream of human consciousness the unique and characteristic development belonging to a Soul, or Mind.

[No single volumes can be referred to, which treat of all the topics included in this chapter. The following works may, however, be consulted in this connection. Wundt: Human and Animal Psychology; Lloyd Morgan: An Introduction to Comparative Psychology; Ellis: Man and Woman; Mantegazza: Physiognomy and Expression; Preyer: The Mind of the Child, Parts I and II; Perez: Psychologie de l'Enfant. On the last topics, see the author's Philosophy of Mind.]

CHAPTER XIX

BODY AND MIND

On starting the examination of mental phenomena, which is now about to be concluded, it was said (see p. 4 f.) that certain assumptions must, of necessity, be made by the psychologist. These assumptions were partly such as are common to all students of every science, — namely, the possibility of knowledge, the existence of things to be known, and the general laws of thought as they apply to all investigation of truth, etc. Some of these assumptions, however, were more special to the work of the psychologist. Perhaps it is among the latter class that we should place the truth, at first taken for granted, which it is now proposed to submit to a brief work of revision. It may be summed up as follows: *Psychology assumes the existence of the human body, as acted upon by things, the reality of the mind, and the actuality of causal relations between the two.*

Analysis of the Assumption of Body and Mind. — The truth which it has just been said is taken for granted by the student of the science of psychology, is by no means so simple as it appears. On the contrary, it is a very complex affair. The subordinate conceptions and principles, which are taken for granted as parts of the total assumption, may be sufficiently brought out by a not difficult act of analysis. For example: (1) It is assumed that a thing called "the body" exists, which is in some distinct way separable from other things, and also separable — at least in thought — from the existence called "mind"; (2) it is assumed that this body, while it must not be identified with other things, is influenced or acted upon by them; (3) it is also assumed that, in some valid meaning of the adjective, the mind is a *real* existence; and (4) it is assumed that actual relations exist between these two existences, — between the body and the mind.

If it were proposed to make a thorough critical work of investigating this mass of assumptions, we should find ourselves involved in an extended treatise on metaphysics. Every one of the principal "categories" would have to be treated from the beginning; — its origin discussed, its validity tested, its compatibility with its allied categories examined. For surely here they all are: Being, Existence, Relation, Action, Change, Force, Cause, Law, etc. Now, inasmuch as the work of systematic metaphysics does not belong to the student of "mental phenomena, as such," we must refrain from the pursuit of the alluring speculations which psychology opens before us. But it is well to remember that the assumption itself is not *put into the facts* by the student of psychology; it is *found in the facts*, as a complex of cognitions and beliefs observed to be operative in the case of all adult minds.

The crude and uncritical form of the complex assumption of Body *and* Mind, — both real existences, — and of actual *relations between* them (as well as of relations between the latter and things in general, *through* the former) is sometimes called "Natural Dualism." It is the popular and unscientific view. In our judgment, however, this view is not essentially modified, nor in the very slightest degree discredited, by the most strictly scientific psychology. Such a psychology does three things, chiefly, for the assumption: (1) It directly contributes to the formation of a scientific conception of mind; (2) it indirectly assists in clearing up and enlarging some points in the scientific conception of the body; and (3) it investigates, and formulates in detail, the relations found to be actually existing between the body and the mind. What it is to be an actual existence; In what the unity of the mind consists, and how we are to understand and vindicate its reality; What it is to be causally (or otherwise) related, etc., — these are the very questions with which metaphysics delights to busy itself. And *these* questions the psychologist must hand over to the combatants in the arena which is constructed for them.

The task of a scientific psychology is scarcely finished, however, until it has viewed again its own very complex but fundamental assumption. Especially appropriate does it seem to consider briefly the character of those *relations* between the body and the mind with which, as a large part of its own special field of investigation, modern psychology is accustomed to deal. But the character of these relations is largely dependent upon the conceptions which are formed of the two terms that enter into the relations. These are the Body and the Mind. We consider, then, first: —

The Conception of Body. — It has already been shown (p. 312 f.) how the average adult makes that "bi-partition" of all his complex experience which leads him to form the conception of his own body. The process results in his "splitting off" this particular thing from other things which do not in like manner belong to the "Self." And the continuance of the same process results in a further separation of a more subtile and limited kind; this is the "splitting off" of the body, regarded as itself a sort of thing from the Mind, or from the thinking, willing, and knowing Self. The popular conception of the body, as this conception is then constituted, has its basis in perceptions of sight, touch, and organic sensations; it is formed by precisely the same active process of primary intellection extended to logical thinking which is necessary for the formation of any conception. We may conclude, then, that *the "common-sense" notion of one's own body is, as respects both the elements of experience which enter it and the method of its formation, essentially the same as the notion of any other material thing.*

Of course, there enter into the popular conception many more or less interesting bits of information (mostly of *mis*information) which are current respecting the real nature of that particular thing called "the human body." Such factors are — some of them — now-a-days so early and persistently taught to every educated child that they come to seem a part of his most essential conception of his own body. This is especially true of the current notions respecting the brain and nervous system. But it must not be forgotten that the most acutely observing and reflective human consciousness, if unaided by the results of a complex and historical development of science, could never even discover that any particular relation exists between the nerve-mass and mental development. Aristotle did not suspect this, although he was the son of a physician and had himself made many observations of dissected animals. So far as the "plain man's consciousness" of his own body separates it from the sentient Self, it is made of essentially the same kind of "stuff" as that of which other things are made.

But the scientific conception of the human body is a very different affair from the current natural conception. And if one inquire, What is the human body really known to be, by the most enlightened intelligences? one must go to physics, chemistry, biology, human anatomy and physiology, — especially to the histology and physiology of the nervous system, — for the answer. This answer, fully given or even imperfectly sketched, would require volumes. And although it would be found that much of these sciences is *psychology in disguise*, the latter science cannot enter into so extended a search after a satisfactory answer to its own inquiry.

The modern scientific conception of a human body may be, however, sufficiently summed up for our present purpose in the following sentence: *By "the body" is understood a system of physical elements, which, under exceedingly* *complex and obscure influences from internal forces and as modified by the action of their environment, attain temporarily a certain morphological and physiological unity, and go through a peculiar course of development.* Something like this summary is doubtless demanded by the discoveries of modern science. Psychologists and philosophers would do well to bear it in mind when they are discussing the relations of mind and body.

Relations of the Body to External Nature. — A brief reference to the foregoing statement of the scientific conception of body shows that this statement makes the body an inseparable part of its physical environment. It appears, indeed, to the child and to the savage, and in a modified way to us all, as an inseparable part of the real Self. (Comp. p. 318 f.) *But as science is bound to regard it, the body is an inseparable part of that Nature to which we in our developed cognition oppose the Self.* It is always the product, the construction, the child, the vehicle, — an actual portion that cannot be disjoined — of the great world of physical existences and natural forces.

The truth of the statement just made will appear at once more clearly, if we analyze the scientific conception of the body, Thus: — (1) Its elements are physical — the same kind of minute beings that compose the mass, or so-called "substance" of other things (oxygen, hydrogen, etc., and their compounds); (2) they are originally brought together into a system under the influence of certain very complex and obscure internal forces, physico-chemical and biological (among these, all that is vaguely included under "heredity," "variability," etc.); (3) they are modified constantly by the environment (including every force external to the body, from the surroundings of the first germ plasm to those of the adult organism); (4) the unity of the body is only morphological and physiological, and consists in a rather loose and shifty adherence to a typical form and to a community of functioning; but (5) this unity is only temporary, and all the physical elements soon return from their systematic arrangement in the one body to other connections with that Nature to which they all belong.

It seems to us the more necessary to insist upon all this, because certain theories have emphasized some sort of a unity between body and mind at the expense of the undoubted unity which exists between the body and Nature at large. We call it "ours," to be sure; but it is only a temporary loan, which is constantly being called in piecemeal; and which may be all called in at any time. Lotze's figure of speech, which compares the human organism to a little whirlpool set up for a brief time in the great stream of natural forces, gives us the true thought in much better accord with scientific facts than do these theories. The linking of what we call our body to its environment is the pertinent and permanent thing upon which modern science has a right to insist, and which it is able to describe in detail. As to the more precise nature, or even the general fact, of its linking to the stream of consciousness, modern science has little beyond unproved conjectures to offer. The physico-chemical and biological science of the human body *and* nature is a highly elaborate and relatively trustworthy affair. The psycho-physical science of body *and* mind is yet in its infancy, if indeed it can fairly be said to have been born.

As to the more specific relations in which the human body stands to Nature at large, all that is necessary for so brief a psychological treatment has already been said. The various sciences from which the conception of body is derived have each their information to contribute. Some of this information has been drawn upon at almost every point in our study; — this, wherever it has been shown how external things act upon the organism so as to get themselves perceived, or so as to excite our feelings in pleasurable or painful ways, or so as themselves to call out and be modified by our voluntary movements. All this helps to form the picture of a complex physical structure which is constantly being stimulated to a great variety of reactions, that occur in response to the action upon it of a great variety of physico-chemical forces.

We turn now to consider in a word —

The Conception of Mind. — In some sort every psychological study, even of the most inconsiderable of mental phenomena, contributes toward the formation of a true conception of the nature of the human mind. How this conception develops and what it really comes to be for the average unscientific man, has been indicated in a preceding chapter (chap. XV). The fuller critical and reflective discussion of this conception belongs to philosophy. For such a discussion the student may be referred to the author's *Philosophy of Mind* (especially the chapter on "The Concept of Mind"). Here again we must content ourselves with a brief summary of what the appropriate science authorizes as the true content of this conception. It may be stated approximately in some such sentence as follows: *By "the mind" is understood the Subject of a conscious development which characterizes itself as a unitary being having its peculiar, self-known modes of behavior* — self-consciousness, memory, thought, voluntary action, etc., or the different forms of the so-called faculties of Intellect, Feeling, and Will.

Now if this conception be analyzed, we find that it, like the scientific conception of the body, contains no little metaphysics which may need further reflective consideration. But so much at least of metaphysics seems necessary in order to state, even in the most non-metaphysical way, all the important contents of the conception. These contents may be itemized somewhat as follows: (1) The mind knows itself as in some sort really existing; (2) it knows itself as in some sort a unity; (3) it is certainly subject to a course of *conscious* development which, in thought at least, is quite distinctly separable from that course of development through which the physical elements, called the body, are passing; and (4) it knows its own characteristic modes of behavior and attributes them to itself as its own powers, activities, faculties. All this has been both implied and abundantly proved in all our previous study of the actual development of the mental life. Every chapter in the book, and every chapter in every book on psychology that ever was written or ever will be written, assumes and validates substantially the same conception. We cannot narrow the sphere or contract the results of psychological study so as to exclude the important factors of this conception of mind. The "old psychology" was, of course, full of it; but the "new psychology" cannot get rid of it. Psychology as a so-called "natural science" takes for granted thus much of metaphysics; and the baldest and most agnostic *solipsism* cannot take much less for granted.

But body and mind — these two beings, thus conceived of as "two" — *are* related. This fact of relation psychology both implies and continually, by the results of its investigations, extends and strengthens in its applications.

General Fact of Relations between Body and Mind. — Nothing is more firmly woven into the texture of experience than this conviction, this manifold knowledge, that what we call "our body" and what we call "our mind" are not indifferent to each other. On the contrary, so intimately related are the two in our system of perceptions and thoughts, that we call them both alike "our own." Thus it is difficult for any individual even to imagine how he would manage or use another individual's body, if his own mind were (to speak popularly) in that other body; or what changes his own so-called mind — his conscious development would undergo, if it were to be all at once "affected" with an exchange of his body with some other person's body.

It should further be noted that the general relation in which all men believe their bodies and minds to be standing toward each other is that called "causal." What it is to be related, and What it is to be a cause, are questions for metaphysics to undertake. Metaphysicians have no small difficulty, and no cool contention, in wrestling with these questions. Especially in considering the latter of the two, does theoretical psychology come against the physical conception of causation as embodied in the modern hypothesis of the conservation and correlation of energy.

Something has already been said, in the name of a scientific psychology, about the origin and nature of the conception of the causal relation (see p. 304 f.).[1] It is enough for our present purpose to add that it is just this causal relation, and no other, which is assumed to apply to the case of mind and body, by all common-sense experience and by all scientific and philosophical theory.

The use of words such as "influence," "induce," "occasion," "concomitant," "correlation," "parallelism," etc., does not in the least explain, but only obscures the facts, unless by these words essentially one and the same thing be meant. No psychology or philosophy of mind will ever be written that will be able to consider the relations of body and mind as otherwise than virtually causal. The reason for this necessity lies in the very nature of the mind itself and in the unchanging laws of its development. *The conception of causation* — although, or rather perhaps because, it is a very complex and somewhat shifty conception — *is the category under which our experience of body and mind develops, divides itself, and then binds itself together again in higher and more rational forms.* It is reflexion upon the experience of the two, as standing perpetually in this relation, which chiefly results in, and gives life-likeness and actuality to, the abstract conception of causation itself.

Another important point to notice concerns the *reciprocal* nature of the relation between body and mind. From the point of view of ordinary experience and of science alike, it is just as apparently true that the mind causes changes in the bodily organism as that this organism affects the mental processes. Not only the phenomena of voluntary movement and the direction of attention, but also those which emphasize the tendency of every process of ideation and feeling to *realize* itself in the motor organism, come in evidence here.

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[1] For more detailed philosophical discussion of this conception, see the author's *Philosophy of Mind* (pp. 212 f.; 223 f.; 230 f.) and *Philosophy of Knowledge* (*passim*).

Particular Forms of Relation between Body and Mind. — To mention in detail the particular relations which exist between the excitement of the organs of the body, and the modifications of the stream of consciousness, would require us to pass in review the whole of psychology. The five following great groups of correlations between body and mind will serve, however, to summarize the facts which our study of the mental life and of its development has already discovered: (1) *The quality and the intensity of the sense-element in our experience is correlated with the condition of the nervous system as acted upon by its appropriate stimuli.* From the one point of view we may say that the precise character and amount of our sensations depends upon the stimulation of the organs of sense, the conveyance of the effects of this stimulation to the central organs, and the kind and amount of nerve-changes originated there. From the other point of view we may say that the resulting sensations, and presumably the nerve-changes that form the basis of these sensations, are determined by our conscious, selective attention.

(2) *The combination of our conscious experiences is correlated with the combination of the impressions made upon the nervous system.* Here again, from one point of view, we must say that the order and time-rate of the phenomena of consciousness depend upon the succession and duration of the stimuli applied to the bodily organism. But from

the other point of view we must say, that the focusing and distribution of attention, and the voluntary movements of our organism, determine the succession and duration of those nerve-changes which the external stimuli occasion.

(3) *The phenomena of representative consciousness, as "recollection" and "memory," are correlated with the "dynamical associations" that have come to be effected between the different portions of the body, — especially the elements of the central nervous system.* But here, yet again, if we are faithful to all the facts, we are obliged to regard both the dependence of consciousness on the acquired, habitual reactions of the bodily organism, and also the dependence of those reactions on our conscious and voluntary pursuit of certain ideas in preference to others, and for selected practical ends.

(4) *The trains of association and of conceptual thinking are somehow correlated with the condition of the bodily organism, — especially of the centres of the brain.* The nature and limits of this correlation are, indeed, even more obscure than any of the three foregoing forms of relation have been found to be. From the point of view of self-consciousness, the indications of this correlation come through our experience of the difficulty of thinking and imagining as we will, under certain bodily conditions; and also through our equally undoubted experience of determining the trains of imagination and of conceptual thinking, as we wish or will to have them — and often in accordance with carefully selected ideas of what they should be.

(5) *The constitution and development of the bodily organism is correlated with the original mental disposition and with the mental development.* Here too, finally, what has already been said in all the latter portion of our work, and especially in the last two chapters, must afford a warrant for our conclusion.

The recognition of such forms of correlation between the body and the mind in no respects contradicts what we were forced to admit under the general head just preceding. The *science* of the human body links it firmly into a unity with that nature of which it is always a part. These rather loosely conceived forms of interaction between this body and that stream of consciousness we call the Self, or mind, do not constitute anything similar; they do not amount to a science uniting two species of objects under one class or kind.

Mind and Brain. — Modern science has done nothing to invalidate the general fact of relation between body and mind; it has done nothing to alter essentially the conception which we must hold of the general character of these relations. But it has made one most startling discovery; and it has apparently demonstrated, so that it can never again be thrown into doubt, the truth of this discovery. This discovery is the special and even unique character of the relations which exist, in man's case, between the nervous system — above all and most directly, the brain — and the stream of consciousness. Whatever may be true of the plants and of some of the lower animals — and here we find room for almost indefinite and yet fruitless conjecture — *it is in man's case the brain which stands related to the development of his mental life, in the most direct, important, and entirely unique way.*

The proof of the statement just made is no less than the entire modern science of the physiology of the nervous system and the allied science of physiological psychology, in the more restricted meaning of the latter term.

The dependence of conscious states on the functioning of the brain is so much a matter of academical instruction, and even of wide-spreading popular impression at the present time, that one is tempted to forget how very recent and complicated and entangled with many abstruse problems this conclusion really is. Whatever may be thought of ancient impressions, and of long existing but shadowy claims, the *science* of the subject is a growth of the last twenty-five or thirty years.

The modern scientific view of the assumptions involved in our most common and even constant experience has, therefore, changed the theme from a discussion of relations between a visible and tangible entity called "body," and an invisible and intangible entity called "mind," to a discussion of relations between functions of the cerebral substance and modifications in the stream of consciousness; and *vice versa*. This change has both simplified and complicated the problem. It has made the problem simpler because, instead of having to consider a great variety of organs, with their peculiar forms of functioning, in their varying relations to the conscious states, we may focus our attention and concentrate our researches upon this one organ (the brain) with its peculiar forms of functioning. But it has also made the problem more difficult and more complicated. For of all material structures the brain is the most difficult to examine and to comprehend in terms of physics, chemistry, and biology. What it is doing when it is, so to speak, laying the basis for the changes in conscious states, is almost entirely hidden from direct observation. And so far as we are at all able to frame a conjectural notion of these, its unique forms of functioning, they appear thus far to baffle the united efforts of all the chemico-physical sciences to reduce them to general principles.

The tendencies to affect the science of psychology which have resulted from this modern discovery of the vast significance of the brain for mental development have taken two directions. They have led some to conclude that the only scientific psychology is psychology as a "natural science." And by calling psychology a natural science they mean to affirm that it is a *biological* science in a very special way. The only causes of conscious states at which we can come in a scientific way, they affirm, are brain states. If, then, we wish to arrive at psychological *science*, we must know where in the brain, what as a matter of chemical changes, and how associated, are the particular brain-commotions correlated with every kind of modification of consciousness. This fair vision of a deductive science, which shall be able to predict definite conscious states as the necessary consequences of brain states, hovers before some minds that have been captivated by the modern discovery. On the contrary, the hope excited by the modern discovery is met at once with the confession of the most expert investigators: There is no *science* of brain physiology. But if this be so, what faith can be placed at present in the conclusions of a so-called "natural science" of psychology?

It is not necessary to discuss again the nature of psychology, its method, and its claims to be received among the brotherhood of sciences. As a study of conscious states — their conditions, significance, and order in development — psychology regards the relations of brain and mind with intense interest but with a well-moderated attitude of reserve and of freedom. It desires to know what the modern theory of the brain and its functions can tell as to the conditions of mental development. But the fundamental questions as to the real relations between the doings of the physical organism and the changes in the stream of consciousness are not, for it, in any respect essentially changed.

What is known of the most general relations of mind and brain may conveniently be considered under two heads: (1) There are certain relations which may fitly be spoken of as *dynamical;* (2) there are others which may be referred to as more especially *local.* The simple facts are that "work" is done in the brain which, as respects its amount, specific quality, duration, and order of change, is correlated with changes in the intensity, quality, and time-rate of the conscious states. As to what the precise character of this work is, our present condition of information is very unsatisfactory. But again, whatever the chemico-physical character of the brain changes may be, we now know that their occurrence in different areas of the brain is somewhat specifically correlated with different kinds of conscious states. The one set of facts results in various rather vague forms of a "dynamical" theory of the relations of brain and mind. The other set of facts results in a body of knowledge, of growing definiteness and evidence, called the "localization of cerebral function."

Certain conclusions touching both these sets of relations between brain and mind will now be briefly presented.

The Brain as a Physical Mechanism. — Some parts of the human body — as, for example, the arrangement of the bones of the skeleton, the structure of the heart, the refracting and transmitting media of the eye — are most obviously to be interpreted as applications of well-known principles in physics. With the brain the case is by no means precisely so. It is, indeed, a mass constituted out of an almost innumerable multitude of physical elements, that are arranged into groups, or organs, between which connecting tracts can frequently be traced. Levers, valves, elastic fibres, lenses, etc., are, however, wanting there. Nothing is arranged so as to suggest structural "permanency," or a strict mechanical "unity," "vibrations" originated or "propagated," secretions made and "distributed," or anything properly answering to other like words that have been so often and so thoughtlessly employed. Yet all the evidence goes to show that this soft, and apparently almost unorganized mass within the skull is a *molecular* mechanism of the most amazing complexity and versatility in function. The microscope has revealed much as to its structural complexity; and physiological chemistry is doing effective work toward the discovery of the molecular and atomic changes which go on in this structure.

The chemico-physical sciences give us some such picture as this of that molecular mechanism which is the human brain. There are countless millions of elements in its substance; but they are, so far as its *peculiar* functions are concerned, all apparently of two types, — nerve-cells and nerve-fibres. These elements contain a large store of energy which has a highly complex and unstable chemical constitution. What is called their "excitement" consists in a sort of explosive or slow decomposition of these elements; and this process sets free the stored energy, to be expended in part upon the excitement of adjoining elements. A sort of hierarchy, however, belongs to the nerve-elements of the brain. What goes on there makes itself felt through the entire nervous system; and, also, by means of the lower parts of the nervous system, upon every area of the body to which the nerve-tracts run. Conversely, what happens in these parts of the nervous system outlying the brain, makes itself felt in the nerve-elements of the brain itself.

Modern research has not as yet been able to bring the peculiar transactions of the nerve-elements of the brain into full accord with what the sciences of chemistry, electricity, thermo-dynamics, etc., know about the behavior of non-living things; or even of other forms of tissue which belong to other parts of the body. Even so simple a nerve-apparatus as that composed of a single nerve with a muscle attached, offers as yet unsolved problems to modern science. How much more the immensely complicated molecular structure of the brain! And, then, each of its elements — and especially its full-grown cells — is capable of doing those wonderful things which amœboid bodies can all do; but among them all, perhaps most abundantly the nerve-cells of the human brain.

The foregoing picture — vague and uncertain as it is in many of its features — serves to emphasize a number of important truths. When *we* are affected with sensations, it is because the nerve-elements of the brain have been excited by nerve-commotions coming into its areas from the different organs of sense; and the characteristic quality, the intensity, the time-rate of our sensory consciousness depend upon this excitement. Conversely, when *we* associate ideas and conduct trains of thinking, it is implied that the different areas of the brain are active in an associated or combined way. When *we* move our bodies, or any of their members, in a controlled and purposeful way, it is because the appropriate nerve-elements in the brain have responded to our ideas and volitions by doing the work of exciting the right muscles through the down-going nerve-tracts which connect them with these muscles. Thus the general work of the nervous system may be said to be that of *equilibrating the interaction of the different parts* of the body; and the special office of the brain is to do this work in accordance with the conditions of a conscious, mental development.

Moreover, the words which are so fitly but näively used to express the modifications in our *dynamic* consciousness — such as "stress," "effort," "fatigue," or being "used up," "gathering" and "outburst" and "lack" of energy, "summation," "interference," "inhibition," "ease" and "smoothness" or "hardness" and "roughness" of the time *we* are having, etc., — have their correlates in the dynamics of the brain. [For further details of the modern mechanical theory of the nervous system, see Part I of the author's Elements of Physiological Psychology, especially Chapter VII.]

Proofs and Results of "Brain-Work." — Although, as has already been said, a full and precise account of the character of the work done in the human brain cannot be given, there are abundant proofs that work is done there, and that this work is correlated with mental work. Of these proofs the following four may be noticed: (1) A large amount of the arterial blood is used by the brain; and if this supply is cut off or corrupted, the work of the brain stops or is disturbed. This stoppage or disturbance shows itself in corresponding modifications of the stream of consciousness. It has been calculated that, although the weight of the adult's brain is only about one-forty-fifth of his whole body, the supply of blood used up in the brain is about one-eighth of the whole supply. (2) In general, the amount of mental work done — of what we call conscious energy "expended" in thought or emotion — is measured by the amount of waste of tissue which results from the correlated brain-work. We know that *we* have worked hard; and the careful measurement of the quantity of sulphates and phosphates excreted from the broken-down nerve-tissue, shows that the brain has been doing increased work. (3) The rise of temperature in the brain-mass which accompanies all excitement of the stream of consciousness seems to indicate plainly an increase of work done in the brain. This thermic disturbance is slightly different in the different areas of the brain; it is likely to be greatest in the occipital region and when due to emotional excitement; it cannot be accounted for fairly as the effect merely of increased circulation. But (4) it has been demonstrated by actual measurement that the prolonged and severe excitement of the nerve-cells produces a decrease in their volume and a change in the character of their substance. Rest from use is followed by a resumption of the normal size and character of the nerve-cells. And although such ocular demonstration applies only to the spinal nerve-cells of some of the lower animals, there is every reason to believe that the principle demonstrated applies to all nerve-cells: we might almost say, *a fortiori* to the cells of the human brain.

Certain experimental researches on the temperature of the head (*Proceedings* of the Royal Society, 1878) showed that active work of the brain caused a variation of temperature of never more than $\frac{1}{20}$° Cent.; and that this rise was different in different areas, but greatest in the occipital protuberance and when due to emotional disturbance (here compare what has already been said, p. 334 f.). More recent researches led another experimenter (Tanzi) to these conclusions: (1) In deep narcosis, or states of great fear and pain, no change of temperature takes place in the brain; partial paralysis of the brain is shown by this condition. (2) The thermal variation due to excitement occurs over the entire area of the brain. (3) The phenomena are not a simple rise, but an alternate rising and falling; and the extremes sometimes amount to more than a degree Fahr. (4) The changes are due to a diffused "emotional condition."

Dr. Hodge succeeded in reducing the volume of the nucleus of the nerve-cells of the spinal ganglia of frogs and cats almost fifty per cent. by five hours of stimulation. He also found that, in the evening, the fatigued cells of animals which have been active all day (such as English sparrows, pigeons, honey-bees) have greatly shrunken and changed in their apparent molecular constitution.

The bearing of such discoveries on the hygiene of the human nervous system — food, sleep, abstinence from frequently recurring and intense emotions, etc. — is so obvious as to need only a mention.

Significance of Size and Complexity of Brain. — A great amount of pains has been taken to establish generalizations regarding the size and growth of the human brain, and the amount and stages of intellectual development. This labor has not been altogether fruitless, but it cannot be said as yet to have attained its end. If we compare the weight of man's brain with that of the brains of the lower animals, the results are confusing. The absolute weight of the human brain (in the normal adult, from somewhat more than 1200 grammes to somewhat less than 1400 grammes) is greater than the weight of the brain of any of the lower animals, except the elephant and the whale. If the fairer standard of weight of brain relative to body-weight be adopted, and a scale prepared to include many widely separated species, the result is still disappointing. Man stands well in the scale. But the relative weight of the brain is not greatly different in the dolphin, the baboon, and man. And in such a scale the elephant stands lower than the salamander or the sheep.

If we compare the different races as respects brain-weight we have the following result: average in grammes of European males, 1340; Oceanic, 1293; American, 1282; Asiatic, 1278; African, 1268; Australian, 1190. Suppose it be admitted that the two extremes of brain size, as here given, measure fairly well the extremes of intelligence; as Professor Donaldson has said, we should not be satisfied to arrange the intelligence of the intermediate groups by the same scale. Besides, the average weight of the adult female European is to that of the adult male European about as 1220 to 1340 or 1350; and a table which compared the two sexes would put the European female on about the same level with the Australian male, "thereby suggesting that the inference from brain-weight to intelligence is not a happy one."

From comparisons of gross size and weight two conclusions, however, may be drawn and defended by the facts: (1) When the brain-weight of the adult falls below a certain rather indefinite limit, — 1000 to 1100 grammes in the male, and 900 to 1000 grammes in the female, — this deficiency is significant of a deficiency in mind and in capacity for mental development. (2) The fact that the brain of the male is absolutely larger than the brain of the female, in spite of all differences of race and at all the different stages of growth, is significant of some corresponding difference in, at least, the more general characteristics of psychical life and development. The problem of sexual difference is, however, a very complex one. And since the difference in weight of the brain is quite balanced by the difference in gross weight of the entire body, it seems to be suggested that psychical differences of sex are dependent upon differences in the entire bodily development rather than upon the single difference in absolute brain-weight.

The title of man to preëminence over all the lower animals, as regards his brain development, is clear when we consider not merely gross weight and size, but rather the characteristic forms of development. In the number of its elements, in the richness and complexity of its convolutions, in the relative amount of matter belonging to the hemispheres and especially to their frontal portions, the human brain much surpasses that of any of the species of lower animals. When, however, we come to compare the two sexes, the different human races, different individuals and classes of the same race, we soon discover the limitations of our knowledge. Marked deficiencies in these particulars do, indeed, indicate a limited psychical capacity and development. Excesses, or even a not excessive rise above the normal average, in cerebral complexity of structure and development, cannot be definitely connected with superior intellectual capacity. We are not able as yet to carry out comparisons of this sort successfully, on the basis of secure generalizations; and perhaps we never shall be able.

Growth and "Education" of the Brain. — The growth of the brain is undoubtedly connected in a most important way with the mental development. Certain facts are succinctly stated in the following quotation from Professor Donaldson: "At birth the weight of the encephalon is nearly alike in the sexes, and in both growth during the first year, and indeed during the first four years, is rapid. By the seventh year the encephalon has reached approximately its full weight, the subsequent increase being comparatively small. There is no other peculiarity in the growth process of either sex, unless later observations should show that the approximation of the curves at fourteen years is really significant. . . . Should this curve be extended to ninety years, there would be found nearly the same weight of the brain persisting up to the onset of old age (about fifty years), when there appears a loss in weight, which becomes rapidly more evident, so that the smaller brain weight of the aged must represent a percentage of loss in some instances quite large."

Certain conclusions of great apparent interest to psychology are suggested from the history of the growth of the normal brain. In its structure the cerebral development is all made ready for use before it comes into contact, through the organs of sense, with the stimuli provided by external nature. The nerve-elements of the cerebrum are formed before the child is born; although they are not by any means all developed to maturity. After birth, therefore, the growth of the brain consists in the enlargement and maturing of its elements; and the education of the brain consists in the establishment of habitual forms of reaction to excitement, and of "dynamical associations" or combinations in functioning, on the part of these elements.

Turning attention now for a moment to the meaning of all this as affecting the modifications of the stream of consciousness, the following conclusion seems suggested: *The functional development of the brain depends upon the character of the excitements to which it is subject, and upon the constitutional and acquired character of its associated reactions; these latter are, however, in a measure dependent upon the character of the conscious states and of mental development; therefore what we call the mind determines in a measure the characteristic functional development of the central nervous mechanism.* In more popular language we may say that, within certain limits, we determine the growth and education of *our own* brains.

Localization of Cerebral Function. — For a considerable time before the proofs of modern science began to accumulate it was suspected by many observers that all the areas of the brain were not equally concerned in, or related to, the different characteristic forms of mental processes. The extremes of the older school of phrenologists (Gall, Spurzheim, etc.) had brought about such a reaction, however, that at the middle of the present century the greatest physiologists of the world rejected the theory of cerebral localization. They believed that the hemispheres of the brain function as a unity and with an indifference as to the value of their different areas. It was not until 1870 that the theory of cerebral localization was placed upon a firm basis of experiment and of observed fact. E. Hitzig had noticed that certain movements of the eyes and of other muscles followed the application of the electrical current to the head of his patients; and in company with G. Fritsch he began to experiment by stimulating minute areas of the cerebral cortex of dogs. From these beginnings the researches of physiologists have gone on until the elaborate modern doctrine has been established beyond reasonable doubt.

By the "localization of cerebral function" we understand that the nerve-processes which take place in the different areas of the brain's hemispheres are specifically related to different mental processes, or to different factors in the complex mental processes. The precise character of this relation the theory does not claim to establish; with the metaphysics of the suggested problems it has little or nothing to do. In a word, work must, in all ordinary and normal cases, be done in certain more or less definitely (yet as a rule, if not always, somewhat vaguely and shiftingly) located portions of the brain, if the correlation between particular processes of the mind and the brain is to be maintained.

Evidence for Cerebral Localization. — We cannot enter into the details of the evidence for the theory just announced. It is enough to say that this evidence is, in the main, of three kinds: (1) experimentation, (2) anatomy and histology, including the study of the brain of the embryo and the infant, and (3) pathology. The first kind of evidence shows what particular sensory-motor activities are occasioned by stimulating certain definite areas of the brain, and what activities are impaired or lost by extirpating the same areas — in the case of the lower animals. The second kind of evidence consists in tracing the connections between the different cerebral areas and the corresponding organs of sense, or amongst the cerebral areas themselves; and so inferring their functions from the observed facts of nervous connections. The evidence from pathology is gathered by a careful study of selected cases where disease or injury of the different brain areas, in man, can be correlated with the impairment or loss of characteristic mental processes.

It must not be imagined that the indications of all these forms of evidence are equally clear or always conclusive; but little by little the knowledge of the true state of the case has been approximately won. Experiment suggests the problem; histology, and especially pathology, afford the conclusive answer.

Conclusions as to Cerebral Localization. — The accompanying diagrams (24 and 25) present to the eye the present standing of the most acceptable claims of modern science to indicate what parts of the brain's hemispheres are especially concerned in the different specific forms of psychical processes. These diagrams should not, however, be read off and interpreted without constantly bearing in mind the following considerations: (1) The different portions of the brain, and indeed the entire nervous system, perform their specific functions only when they are brought into the proper connections and are thus exercised in the performance of those functions. (2) These so-called "centres" or "areas" cannot be regarded as definite and strictly limited localities. They overlap and interpenetrate; they widen under the influence of heightened energy; they vary in the case of the individual man;

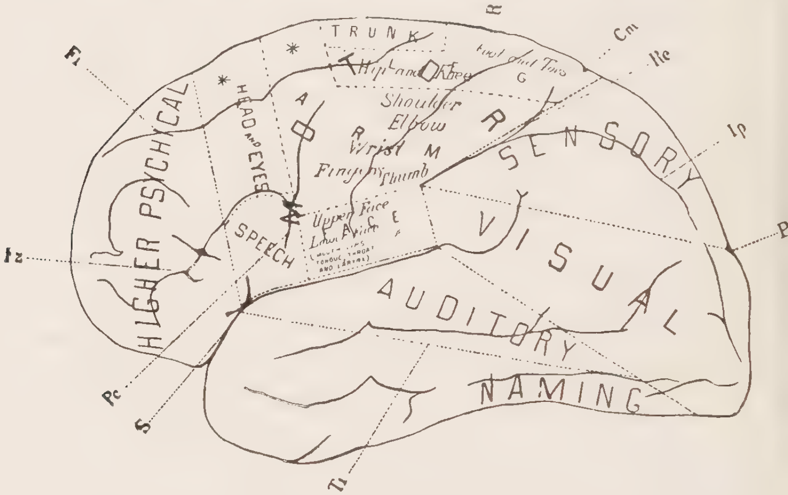
R
Cm
Po
Ip
F1
F2
Pc
S
T1
TRUNK
Hip and Knee
Foot and Toes
L E G
Shoulder
Elbow
Wrist
Fingers
Thumb
A R M
Upper Face
Lower Face
(Mouth, Lips, Tongue, Throat and Larynx)
F A C E
HEAD AND EYES
SPEECH
HIGHER PSYCHICAL
SENSORY
VISUAL
AUDITORY
NAMING

Fig. 24

Fig. 24, lateral, and Fig. 25, median, view of the human brain. *S*, fissure of Sylvius; *R*, of Rolando; T_1, first temporal; *Po*, parieto-occipital; *Ip*, interparietal; *Cm*, calloso-marginal; F_1, first frontal.

they do not act in isolation. (3) Within certain limits the principle of "substitution" applies. If any one of these "centres" becomes impaired, the most nearly contiguous parts of the brain, or the corresponding parts of the opposite hemisphere, or the parts most closely allied physiologically, may "help out" the impaired member of the cerebral organism.

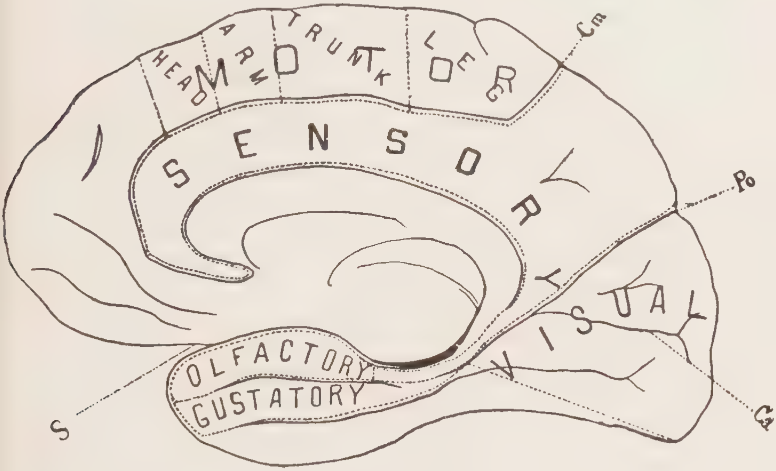

FIG. 25

It should also be borne in mind that the evidence for all the "localizations" indicated by the diagrams is by no means equally conclusive. For the so-called "Motor" region the evidence is best established, even to a considerable detail of the regions for the upper and lower limbs. The general "Sensory" region for the trunk and limbs overlaps the motor, but on the whole lies somewhat further back. The so-called "Visual" region probably stands next in its claim to be established upon unimpeachable evidence; although the motor activities involved in "Speech" may perhaps claim to stand upon equally good grounds. From this point onward the theory of the localization of other cerebral functions can only claim a diminishing amount of convincing evidence; until we come to the so-called "higher psychical" functions, which seem largely, at present, assigned to the frontal regions for lack of any other work which can be given these regions to do.

Very recently (1894–96) Professor Flechsig has advanced claims looking toward what he is pleased to call "the localization of the spiritual processes," and which he proposes to extend and defend further by subsequent publications of the evidence and of the results of his research. This investigator would divide the entire hemispheres of the brain into two great divisions. All the centres that have to do with the various forms of sense and with the correlated motion of the organs of sense, he would group together under the term, the "sphere of bodily feeling." This "sphere" is the representative in the upper part of the brain of those areas in its lower parts which are concerned in the automatic and reflex, but not intelligent and "apperceptive" action of the same sensory-motor organism. Therefore, it is the essential organ of self-consciousness. The remaining two-thirds of the hemispheres of the brain are left to act as "association- and coagitation-centres." (By "coagitation" Flechsig means "thinking" as involving what the "Latin language prophetically" considered as a synthesis, or bringing together, of different elements.)

On examining the nature of these claims, it appears that the view which relates the so-called "sphere of bodily feeling" to the consciousness of Self is tenable just in so far as this form of consciousness is dependent upon such feeling. But, certainly, that knowledge of Self which the thinking mind develops implies all possible activities of association and thinking. It, therefore, involves the entire central organism. And as to the localization of association and thinking in any special centres or groups of such centres, the evidence is as yet altogether too meagre, if even we could come to understand what "*localization*" of such general forms of mental activity actually means.

The researches of modern science come to an end here. They give us, indeed, a greatly modified and almost sublimated conception of the human body. But this conception connects us on one side, so to speak, with the invisible entities and mighty but mysterious forces of the physical universe. In this universe the unity of the body is only formal and temporary. The science we are studying, however, shows how the ongoing and developing consciousness constructs from the materials of experience the conception of a spiritual Self. This conception psychology finds penetrated with assumptions as to its own being and unity, and as to the reality of a world of things with which this Self stands related. These relations of the Self to the world of things are all, so far as modern science now knows, *through* the body. The researches of modern psychology end, therefore, so far as this line of its researches is concerned, in the discovery and statement of *a great and indefinite variety of relations between the body and the mind.*

The *science* of psychology is, accordingly, a consistent dualism to the very last. The theory how two such courses of development — the one of a being which is known as the product of the physical universe and the other of a "stream of consciousness" that comes to know itself as a feeling, willing, and knowing Self — can stand related to each other in manifold ways, the psychologist, so long as he remains on the standpoint of his science, turns over to the philosopher.

[For the more detailed study of the subject of this chapter, see Donaldson: The Growth of the Brain; and the author's Elements of Physiological Psychology, or Outlines of Physiological Psychology, — together with the numerous treatises referred to in these works. The philosophical problems suggested are fully discussed in the author's book on the Philosophy of Mind, and in several chapters of the Philosophy of Knowledge.]

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91 AND 93 FIFTH AVENUE NEW YORK, AND 32 HORNBY ROAD, BOMBAY.

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